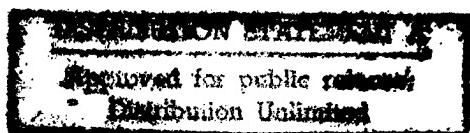


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USSR Report

LIFE SCIENCES

BIOMEDICAL AND BEHAVIORAL SCIENCES

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LIFE SCIENCES
BIOMEDICAL AND BEHAVIORAL SCIENCES**

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AGROTECHNOLOGY

UDC 535.33

DISTANCE ANALYSIS OF CONDITION OF COTTON CROPS UTILIZING SPECTRAL POLARIZATION METHOD

Minsk DOKLADY AKADEMII NAUK BSSR in Russian No 8, Aug 84 (signed to press 9 November 1983) pp 706-708

[Article by Academician of the BSSR AS [Academy of Sciences] L. I. Kiselevskiy, V. Ye. Plyuta, I. G. Spitsyn, Ye. A. Yanovskaya and A. F. Yanovskiy, Institute of Physics of the BSSR AS: "Distance Analysis of the Condition of Cotton Crops Utilizing the Spectral Polarization Method"]

[Text] For implementing measures involving plant protection and the prediction of the agricultural crop harvest objective information is required regarding the phytosanitary status of the crops. Methods that are based on distance measurement of various characteristics of the optical field of agricultural crops are considered to be promising for these purposes (1, 2).

This work examines the possibility of evaluating the condition of healthy stands of cotton and of those infected with wilt, utilizing distance spectropolarimetric methods.

In August-September 1981-1982 in the Uzbek SSR ground and aerial experiments were carried out to study reflective spectral and polarization characteristics and to research the angular structure of cotton's field of intensity.

Ground spectrometry was implemented by means of a ground complex of measuring equipment, which included the MSS-2K spectrometer (3) with a spectral range of 0.5-0.0 mkm [microns] and a spectral resolution of 7 nm [nanometers].

Aerial measurements were carried out from the IL-14 and AN-2 utilizing a complex of equipment on board, including the Barkhan S-1 spectrometer with a spectral range of 0.4-1.1 mkm and a spectral resolution of 10 nm, and the Nadir spectropolarimeter with a range of 0.4-0.75 mkm (4). Spectropolarimetric measurements were carried out in synchrony with MSS-2K spectrometry, which enabled us to precisely correlate polarization information with the spectrums of the objects being studied. The photography of the spectrum and photo surveying are implemented through the lower hatches of the planes. To register falling radiation a light guide with an integrating adapter, extending outside the plane through the upper hatch, is used. Experiments were conducted from

an altitude of 100-500 meters even during cloudless weather with sun zenith angles at $\theta=40-50$ degrees. Photo surveying was carried out by the Barkhan S-1 spectrometer and the Salyut camera.

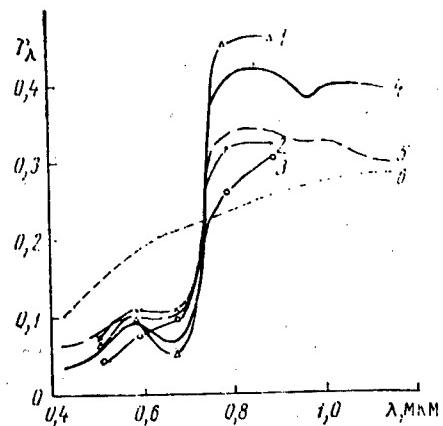
Random errors in calculating the coefficient of spectral intensity (KSYa) for individual realizations of the spectrum for MSS-2K and Barkhan S-1 equipment equal 6 and 5 percent respectively. In analyzing the average values of the KSYa there will be fewer random errors in the sample. Absolute accuracy in determining the ranges P and the azimuth of polarization of reflected radiation by the Nadir spectropolarimeter equals ± 1 percent and ± 10 degrees (if P is greater than 3 percent).

Ground measurements were made from the lowest possible point at a height of 0.5-0.7 meters on the leaves and clusters of cotton plants which were pulled up and placed on black-colored cloth with a KSYa of 0.02. Sketch 1 presents the relationship of the KSYa and the wave length for healthy and totally wilt-infected cotton plants as well as for plants characterized by a deficiency of microelements. We can see that there are differences in the spectral curves in the visible (0.60-0.68 mkm) as well as near infra-red (0.73-0.93 mkm) zones of the spectrum.

During aerial measurements studies were made of test fields with cotton in the phase of the opening of the first boll and of dry-farming soil on which cotton is raised. Projective cover equalled 95-100 percent. Information on the degree of wilt infection in cotton was acquired via traditional methods on the basis of visual evaluations by phytopathologists. Spectral relationships of KSYa of healthy and wilt-infected cotton and dry-farming soil, and wave length measured by the Barkhan S-1 spectrometer are presented in Sketch 1. Existing differences between the results of aerial and ground experiments can be explained by a discrepancy in the conditions of measurement. During ground tests the KSYa of completely healthy and completely wilt-infected cotton leaves and plant clusters was measured, whereas during aerial measurements both healthy and diseased leaves could appear in the viewing field of equipment. The effect of a plant's architectonics is also a possibility.

The angular structure of the intensity fields of cotton and soils was also studied. Measurements were made from an altitude of 200 meters. the sighting angle moved through 15 degrees in the plane of the sun's vertical from the nadir ($\theta=0$ degrees) to $\theta=45$ degrees in the direction of the reverse reflection ($\phi=0$ degrees) and in the direction of the mirror image ($\phi=180$ degrees), as well as perpendicularly toward the vertical of the sun's plane ($\phi=90$ degrees) with a registration of the same part of the object. Significant changes in reflection capability were noted depending on the direction of the observation. In the plane of the sun's vertical (Sketch 2) in the case of the soil as well as of healthy and wilt-infected cotton there is an increase in the spectral density of energy intensity (SPEY_a) in the direction of the sun ($\phi=0$ degrees), which is explained by the effect of reverse glare (5). The soil's SPEY_a increases uniformly, beginning with $\theta=45$ degrees to $\theta=-45$ degrees; the SPEY_a of healthy cotton increases from $\theta=30$ degrees to $\theta=-30$ degrees, and that of cotton infected by wilt--from $\theta=15$ degrees to $\theta=45$ degrees. It is characteristic that this increase for wilt-infected cotton is more

Sketch 1
Dependency of KSY_a of Healthy and Wilt-Infected Cotton and Soil on Wave Length



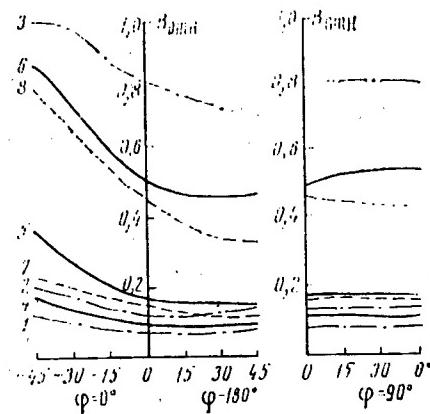
Key: Ground Measurements:

- 1--Healthy cotton
- 2--Cotton infected with wilt
- 3--Cotton with a deficiency of trace elements

Aerial Measurements:

- 4--Healthy cotton
- 5--Cotton infected with wilt
- 6--Soil

Sketch 2
Dependency of Spectral Density of the Energy Intensity of Cotton and Soil
on the Direction of Observations for Healthy Cotton,
Wilt-Infected Cotton and Soil



Key: Healthy Cotton:

- 1--At wave length of 0.45 mkm
- 2--0.68 mkm
- 3--1.0 mkm

Cotton Infected with Wilt:

- 4--0.45 mkm
- 5--0.68 mkm
- 6--1.0 mkm

Soil:

- 7--0.45 mkm
- 8--1.0 mkm

significant (by a factor of 2) than for healthy cotton (by a factor of 1.5) and is less than that for dry-farming soil. This enables us to utilize the angular structure of cotton's field of intensity as a supplementary criterion in the evaluation of crop conditions. In the plane that is perpendicular to the plane of the sun's vertical the reflection of the cotton and the soil is isotropic.

Studies of spectropolarizational characteristics of the objects being examined were carried out using the Nadir spectropolarimeter in four narrow spectral channels of 0.44, 0.54, 0.66 and 0.74 mkm. The table presents the results of measurements of changes in the degree of polarization of reflected radiation in healthy and completely wilt-infected cotton and soil. The degree of radiation polarization reflected by diseased plants is 1.5-2 times greater than in the case of healthy plants and soils, which enables us to utilize polarization characteristics to discover cotton fields that are infected with wilt.

Table

Significance of Degree of Polarization (%) For Waves of Varying Lengths,
 $\theta=40$ degrees, $H=200-400$ meters

Object	$\lambda=0,44$ MKM	$\lambda=0,54$ MKM	$\lambda=0,66$ MKM	$\lambda=0,74$ MKM
Healthy cotton	7	4	5	2
Cotton infected with wilt	11	8	10	6
Dry-farming soil	8	5	5	4
Soil with salt patches	7	5	4	3

In this way, on the basis of investigating the spectral, angular and polarization structure of a field of intensity in healthy and wilt-infected cotton it has been shown to be possible to utilize these characteristics for determining the condition of crops.

The authors wish to express gratitude to G. K. Madaliyeva and A. A. Zharov, workers of TashKhRO [Expansion unknown] of VNIPTIK [Expansion unknown], USSR Ministry of Agriculture, for their help in organizing and carrying out the experiment.

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8228
CSO: 1840/1096

UDC 633/635:58.036.5

PHYSIOLOGICAL AND BIOCHEMICAL BASES OF ADAPTATION OF PLANTS TO FROST (SURVEY)

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 6, Jun 84
(manuscript received 5 Mar 84) pp 3-10

TRUNOVA, T. I., Institute of Plant Physiology imeni K. A. Timiryazev,
USSR Academy of Sciences, Moscow

[Abstract] Current ideas from related literature are used to discuss the problem of frost resistance of plants with emphasis on two aspects of the problem: study of causes of death of plants from frost and explanation of the mechanism of adaptation of plants to frost. Adaptation of plant cells to frost may involve prevention of intracellular ice formation or extracellular ice formation. Three methods of preventing ice formation are discussed. Adaptation of plants to frost includes accumulation of large quantities of sugars, proteins, nucleic acids and lipids. Two strategies of functional adaptation to frost are described; quantitative means involve participation in metabolism of a large quantity of enzymes and qualitative means involve enzymes synthesis with lower values of free energy of activation. Both pathways of regulation involve protein synthesis de novo and require a long time for adaptation. The method of development of resistance to frost by these newly-synthesized proteins is discussed. Knowledge of frost resistance of plants and adaptation to frost is important in determining markers which may be used as a criterion of frost resistance in plant breeding to develop frost resistant varieties. References 33: 28 Russian, 5 Western.

[1077-2791]

UDC 633.34:[58.036.5+631.524.85

SOYBEAN COLD RESISTANCE

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 6, Jun 84
(manuscript received 16 Nov 83) pp 11-16

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[Abstract] This study of soya resistance to cold was based on data in the literature and personal research. Resistance of soya to low temperatures depended on plant metabolism, features of anatomical structure and nature of plant development. All of these factors are under genetic control, therefore soya plant resistance to cold is largely determined by the genotype of the variety. The importance of finding soya-forms with seeds able to sprout at low temperature was stressed. Growing of 56 varieties of soya at 70°C at the All-Union Genetic-Selection Institute is described and discussed. Studies of the effect of minus temperatures (-2 to -12°C in different periods of growth of soya are discussed and the effect of low positive temperatures is described. Genotypical differences of frost-resistance of soya varieties in the process of plant growth is discussed. Methods of evaluating cold resistance of plants and the basic method of producing frost-resistant plants are presented. References 27: 8 Russian, 19 Western.

[1077-2791]

UDC 633.11:632.452

HORIZONTAL RESISTANCE OF VARIOUS WHEAT SPECIES TO LEAF RUST

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 6, Jun 84
(manuscript received 11 Jul 83) pp 78-80

MIKHAYLOVA, L. A. and BOGUSLAVSKIY, R. L., All-Union Scientific Research Institute of Plant Protection, Leningrad; Dagestan Experiment Station of the All-Union Scientific Research Institute of Plant Growing imeni N. I. Vavilov, Derbent, Dagestan ASSR

[Abstract] Comparison of samples of various varieties and species of wheat in regard to horizontal resistance to leaf rust involved study of 65 samples of hexaploid (*T. aestivum*) and 52 samples of tetraploid (*t. dicoccum*, *T. dicoccoides*, *T. persicum* and *T. Durum*) species of wheat with evaluation of leaf-rust resistance by the Odintsova and Mikhaylova method after plants were grown to the flag leaf stage in a green house and then infected by fungus strain No. 10 spores. The most leaf-rust resistant tetraploid wheats were *T. persicum* and *T. durum* and the most susceptible were *T. dicoccum* and *T. dicoccoides*. Soft wheat (*T. aestivum*) samples were placed in one of 3 groups: Transcaucasus samples, Russian samples and contemporary selection samples. The last 2 groups were equally susceptible to leaf rust (on the

average) but some samples were highly resistant. The resistance level of Transcaucasus samples was as high as that of *T. persicum* and *T. durum* samples. Possible explanations for these findings are presented and discussed.

References 9: 6 Russian, 3 Western.

[1077-2791]

INSECTS VERSUS INSECTS

Tallinn SOVETSKAYA ESTONIYA in Russian 25 Jul 84 p 3

PATYKO, D., Minsk

[Abstract] Scientists at the Belorussian Academy of Sciences Institute of Bioorganic Chemistry have for the first time synthesized a new type of chemical--the so-called chiromones--that acts as a behavioral bioregulator in some agricultural insect pests. Institute associate A. Bykhovets explained that insects are able to detect these substances from distances up to several kilometers. The substances appear to act as signals, providing insects with information on dangers, the availability of food, and the gathering of groups of insects, and they are also used to mark off territory. Research on the chiromones was prompted by the search for effective, non-traditional ways of dealing with pests in agriculture in order to obviate the need for the use of increasing amounts of chemical pesticides. Scientists in Minsk first synthesized the pheromones, which have been used to destroy the males of insect pests. The chiromones act by attracting the natural enemies of insect pests to protected areas. Last year, using only a few grams of chiromones, chemists succeeded in protecting the harvest in a large fruit orchard at a kolkhoz in Minsk Oblast. In this test of the chiromones, wasps were induced to destroy insects that had been causing serious damage to fruit trees. This year, pest control experiments will be conducted not only in orchards but also vegetable sowings. The scientists are now working on an industrial technology for producing these chemicals. No references.

[786-9642]

UDC 631.563

HARVEST PROTECTION--KEY BIOLOGICAL PROBLEM

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 6, Jun 84 pp 64-75

KURSANOV, A. L., academician, and METLITSKIY, L. V., doctor of agricultural sciences

[Abstract] A review is provided of the various factors involved in the storage of crop harvests, in terms of preserving quantity and quality. One of the most important factors responsible for crop losses during storage is

contamination with phytopathogenic microorganisms, which results in product spoilage and/or production of toxins that may find their way into human and animal food. Other factors that affect crops during storage are various physiological and biochemical changes that may variously affect their usefulness. Coverage is also given to the various methods used to protect and preserve the crops, such as chemicals, physical conditions (temperature, humidity), irradiation, etc. Emphasis is placed on the importance of careful analysis of the various storage and preservation conditions and of the balance between them to insure optimum food supply and utilization of agricultural resources.

[769-12172]

BIOCHEMISTRY

UDC 541.183+577.15

CORRELATION BETWEEN pH OPTIMUMS FOR PROTEIN IMMOBILIZATION AND PROTEIN pI

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 56, No 4,
Jul-Aug 84 (manuscript received 14 Oct 83) pp 390-394

LYUBINSKIY, G. V., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy,
Ukrainian SSR Academy of Sciences, Kiev

[Abstract] An analysis was made of the pH optimum of immobilization of 19 proteins and their pI. Using various carriers requiring chemical bonding or physical adsorption, the optimum pH for immobilization was found to be primarily dependent on the pI of the protein. Applying the method of least squares to the linear relationship between these two parameters led to the following equation for determining the optimum pH: $pH_{op} = 1.75 + 0.62(pI)$. Figures 1; references 38: 20 Russian, 18 Western.

[1568-12172]

UDC 541.183.4:577.156.3

PROPERTIES OF FUSARIUM GRAMINEARUM IMV-F-No 1060 GALACTOOXIDASE IMMOBILIZED ON AMINOORGANOSILOCHROMES

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 56, No 4,
Jul-Aug 84 (manuscript received 4 Nov 83) pp 394-398

KONDAKOVA, L. V., YANISHPOL'SKIY, V. V., TYORTIKH, V. A., BUGLOVA, T. T. and KOROLEVA, O. V., Institute of Physical Chemistry imeni L. V. Pisarzhevskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] In order to expand the use of galactooxidase (EC 1.1.3.9) for analytical purposes, studies were conducted on the substrate specificity of immobilized galactooxidase preparations derived from Fusarium graminearum IMV-F-No 1060. The enzyme was immobilized on C-80 aminoorganosilochrome following activation with 2,4-toluylene diisocyanate and cyanurin chloride. In 0.5 M phosphate buffer, pH 7.0, soluble preparations of the enzyme lost

half of their initial activity in 3-6 h at 25°C, whereas immobilized preparations retained high levels of activity for at least 8 h. Furthermore, while the soluble enzyme has a narrow pH optimum at pH 7.0, the immobilized enzyme showed activity over a pH range of 5.8-8.0. Testing of various substrates showed that oxidation of lactose by the immobilized enzyme was five-fold less efficient than that of galactose, while oxidation of D-raffinose was three times more efficient than the oxidation of galactose. Both the immobilized and soluble galactooxidase preparations failed to oxidize D(+)glucose, D(+)maltose, D(-)mannitol, DL(+)sucrose, L(+)arabinose, 1-dulcitol, 1-inositol, L(+)rhamnose, D(+)xylose or D(+)sorbitol. Figures 4; references 10: 1 Ukrainian, 5 Russian, 4 Western.

[1568-12172]

UDC 576.314+577.1.612.35

Ca⁺⁺ RELEASE FROM RAT HEPATOCYTE MITOCHONDRIA FOLLOWING FREEZING AT LIQUID NITROGEN TEMPERATURE

Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 56, No 4, Jul-Aug 84
(manuscript received 3 May 83) pp 447-451

PETRENKO, A. Yu., BELOUS, A. M. and ZHEGUNOV, G. F., Institute of Cryobiological and Cryomedical Problems, Kharkov

[Abstract] Subjecting Wistar rat liver mitochondria to a cycle of freezing at the temperature of liquid nitrogen and subsequent thawing to 40°C in a tris-HCl buffer, pH 7.4, supplemented with succinate and phosphate, resulted in an initial short-term uptake of Ca⁺⁺ from the medium and its subsequent release from the mitochondria. The loss of Ca⁺⁺ from the mitochondria is accompanied by a decrease in the value of the membrane potential. Addition of ATPase inhibitor (oligomycin) or NADH dehydrogenase inhibitor (rotenone) to the medium prior to the onset of Ca⁺⁺ loss inhibits both calcium release and the fall in the membrane potential. Addition of ADP during Ca⁺⁺ release results in the uptake of Ca⁺⁺. In a system in which the incubate contains malate + glutamate rather than succinate, Ca⁺⁺ is not released, and a similar failure of Ca⁺⁺ release is observed on addition of the antioxidant ionol. These observations indicate that Ca⁺⁺ loss from mitochondria subjected to a cycle of freezing and thawing is due to activation of lipid peroxidation and is controlled by the pool of reduced pyridine nucleotides. Figures 3; references 22: 4 Russian, 18 Western.

[1568-12172]

UDC 547.963.3

EFFECTS OF SELF-PHOSPHORYLATION OF RNA-BINDING PROTEINS ON BINDING PARAMETERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 275, No 5, Apr 84
(manuscript received 21 Nov 83) pp 1227-1230

STEPANOV, A. S. and KANDROR, K. V., Institute of Biochemistry
imeni A. N. Bakh, USSR Academy of Sciences, Moscow

[Abstract] Determinations were made of the effects of self-phosphorylation of RNA-binding proteins on the degree of mRNA binding, using ribosome-free extracts prepared from the oocytes of *Rana temporaria* for isolation of the binding proteins on poly(U)-Sepharose. Incubation studies with the endogenous protein kinase system showed that ATP uptake was accompanied by a 8-17% reduction in RNA binding. The relatively low decrease in the binding data was due to the fact that not all RNA-binding peptides serve as substrates for the protein kinase. The decrease in RNA binding was directly related to the ATP concentration in the incubate, and showed a positive correlation with the degree of specific phosphorylation. The latter observation indicated that the change in binding was due to self-phosphorylation. It remains to be determined which proteins specifically are so affected by phosphorylation, and whether they are involved in the regulation of translation. Figures 3; references 15: 3 Russian, 12 Western.

[794-12172]

UDC 581.2

ANTIGENIC COMPOSITION AND SIMILARITY BETWEEN RYE AND RUST FUNGI PROTEINS

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 28, No 5, May 84
(manuscript received 18 Jul 83) pp 459-461

PODCHUFAROVA, G. M., SEROVA, Z. Ya., NEKLESA, N. P., GINTS, T. A. and
KULIKOVA, T. I., Institute of Experimental Botany imeni V. F. Kuprevich,
Belorussian SSR Academy of Sciences

[Abstract] An analysis was made of the antigenic composition of healthy and infected Kharkov-60 rye leaf proteins, and of the proteins of the pathogenic agents *Puccinia dispersa* and *P. graminis*, using immunoelectrophoretic techniques. The technique employed did not reveal any qualitative changes in the leaf proteins as a result of infection with the rust fungi. However, comparison of the leaf protein patterns and the cross-reaction of anti-rye antibodies with fungal proteins demonstrated definite antigenic similarities between these two categories of proteins. These findings of an antigenic similarity between the rye and fungal proteins provides further confirmation for the hypothesis that such similarity favors easy inclusion of the fungal proteins in rye metabolic pathways, and that such similarity is one of the

factors responsible for rye susceptibility to infection by rust fungi.
Figures 2; references 14: 11 Russian, 3 Western.
[1541-12172]

UDC 541.183:577.15.02

CATALYSIS OF ENZYMES ENTRAPPED IN REVERSED MYCELLES OF SURFACTANTS IN ORGANIC SOLVENTS. PEROXIDASE IN OT-WATER-OCTANE AEROSOL SYSTEM

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 18, No 4, Jul-Aug 84
(manuscript received 7 Jun 83) pp 1019-1031

KLYACHKO, N. L., LEVASHOV, A. V. and MARTINEK, K., Chemistry Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] The goal of this study was to find out the causes for acceleration of peroxidase oxidation of pyrogallol in a system of reversed mycelles AOT in octane with different degrees of hydration of surfactants (SA). The spectral and kinetic characteristics of the solubilized enzyme were also studied. In pure octane peroxidase is practically insoluble; addition of water and SA makes it possible to dissolve the enzyme. The principal reasons which could be responsible for accelerated enzymic reaction in reversed mycelles system are: concentration of reagents in the mycellar phase; shift in the pH of this reaction and a change in the reaction medium. The authors have discounted the effect of the first two, concluding that the effect of microenvironment is the crucial one, because of the entrapment of peroxidase in the surfactant reverse mycelles. In fact, depending on the degree of surfactant hydration, the reactivity of the enzymes increases one to two orders of magnitude. The reverse mycelles system may be used as a model for biomembranes. The experimental results showed that the in vivo catalytic activity of enzymes may be much higher than could be anticipated from classical in vitro experiments in aqueous solutions. Figures 8; references 46: 14 Russian, 32 Western
(1 by Russian authors).

[1588-7813]

UDC 577.151.042:577.151.64

TWO FORMS OF NADH-DEHYDROGENASE IN MICROCOCCUS LUTEUS (LYSODEIKTICUS) MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 5, May 84
(manuscript received 22 Nov 83) pp 487-494

ZHUKOVA, I. G., BOLTOVA, N. S., YUZHAKOVA, G. A., MOROZOVA, T. L.,
RUDZIT, E. A., YERMACHENKO, V. A., IGNATOV, V. V. and OSTROVSKIY, D. N.,
Institute of Biochemistry imeni A. N. Bakh, USSR Academy of Sciences (AS),
Moscow; Perm State University; Institute of Plant and Microbial Biochemistry
and Physiology, USSR AS, Saratov; Scientific Research Institute for
Biological Testing of Chemicals, Kupavna, Moscow Oblast

[Abstract] In view of the presence of two forms of NADH-dehydrogenase in *Micrococcus luteus* (*lysodeikticus*), studies were conducted on the selective elimination of one of these forms to facilitate studies on the other. The immunochemically different forms of NADH dehydrogenase (EC 1.6.99.3), are designated I (slow cathodic mobility on electrophoresis) and II (fast mobility). Treatment of the preparations with antibodies raised against *M. luteus* membranes eliminates I without affecting II. However, form II is eliminated from the membrane fraction of *M. luteus* when the cells are grown in the presence of chloramphenicol, which increases the lipid content of the membranes. A series of novel triarylboranes were synthesized and tested for their inhibitory activities against I and II. A tri(*o*-methoxyphenyl) borane:3,5-dimethylpyrazole complex was found to selectively inhibit II with two inhibition constants ($K_1 = 0.23$ and $10 \mu\text{M}$) without affecting I. The effects of the complex on II were prevented or reversed by addition of liposomes, indicating that lipids are involved in the inhibitor-enzyme interaction. Figures 3; references 20: 14 Russian, 6 Western.

[1565-12172]

BIOPHYSICS

UDC 541.144.7

CYCLIC-GMP-BINDING SITES IN PHOTORECEPTOR MEMBRANES

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 18, No 4, Jul-Aug 84
(manuscript received 16 Jun 83) pp 1053-1059

VOLOTOVSKIY, I. D., BARANOVA, L. A., SHEYKO, L. M., LEVKO, A. V. and KONEV, S. V., Institute of Photobiology, BSSR Academy of Sciences, Minsk

[Abstract] Binding of [³H]-cyclic-GMP with structural components of bovine outer rod segments (ORS) was investigated; specific binding centers for c-GMP were identified in disks and in plasma membranes and the role of calmodulin in this process was studied. It was shown that the binding centers for [³H]-c-GMP were found in the disks and in plasma membranes; the concentration of these centers was about identical in both cases, being slightly lower in the membranes. Two types of binding sites for c-GMP were observed with a "high" and "low" affinity for c-GMP ($K_d = 0.1$ to 0.35 and 1.5 to 2.0×10^{-6} M respectively). These receptors are integral membrane proteins associated with phospholipids. The binding of c-GMP to membrane centers was inhibited by calmodulin--a protein controlling Ca-dependent processes in the cells. Figures 4; references 36: 4 Russian, 32 Western (1 by Russian authors).

[1588-7813]

UDC 577.322.52;577.322.53

STUDY OF CALCIUM BINDING TO CALMODULIN BY LASER RAMAN SPECTROSCOPIC METHOD

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 18, No 4, Jul-Aug 84
(manuscript received 15 Apr 83) pp 925-932

KUPTSOV, A. Kh. and BOYKOV, V. A., Scientific Research Institute of Biological Testing of Chemical Compounds, Kupavna, Moscow Oblast

[Abstract] Raman spectroscopy was used to obtain independent complementary information on spacial structure of the polypeptide chain, the state of a number of side groups and of the changes occurring in them during calcium

binding to calmodulin. Studies published during the past decade showed that Raman spectroscopy yields sensitive and highly informative data for studying spacial packing, polypeptide composition and the state of side groups. Analysis of experimental data showed that formation of a complex with calcium cations is accompanied by marked changes in the spectra of calmodulin. The Amide I band became sharper and shifted from 1657 to 1654 cm⁻¹, definite changes occurred in the high frequency band Amide III and the valence and deformation vibrations of C-C(N) skeleton intensified, changing their profile. Detailed analysis of these spectral changes was discussed. Calculations of the Amide I band profile and analysis of the changes observed in Amide III profile showed that complex formation caused conformational changes manifested by increased content of the alpha-helical forms. Figures 5; references 26: 2 Russian, 24 Western.

[1588-7813]

UDC 541.143:577.352.52:579.841.51

TEMPERATURE DEPENDENCE OF PHOTOPOTENTIAL IN FILMS OF PURPLE MEMBRANES OF HALOBACTERIA

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 1, Jan 84
(manuscript received 22 Jul 83) pp 91-98

LUKASHEV, Ye. P., KONONENKO, A. A. and RUBIN, A. B., Biology Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] A method of simultaneous recording of the photopotential and photoreduced absorption changes of bacteriorhodopsin in films of purple membranes in a wide range of temperature from +20°C to -190°C was described and discussed. Samples studied were produced from aqueous suspensions of a preparation of purple membranes from *Holobacterium halobium* strain P. Stages of formation and breakdown of intermediates of the bacteriorhodopsin photocycle (at least K₅₉₀ and M₄₁₂) were electrogenic stages. The kinetics of generation and discharge of the photopotential coincide with the kinetics of formation and decay of the same intermediate which causes it, in the entire temperature range studied. Formation of the primary batho-intermediate K₅₉₀ was accompanied by a shift of electron density in the active center of the bacteriorhodopsin molecule after photoexcitation of retinal. Figures 4; references 26: 8 Russian, 18 Western.

[1561-2791]

UDC 577.115:577.352.462:535.372:543.426

ANTHRYL AND PERYLENOYL LABELLED LIPIDS AS MEMBRANE PROBES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 1, Jan 84
(manuscript received 13 Jul 83) pp 33-43

MOLOTKOVSKTY, Yul. G., MANEVICH, Ye. M., BABAK, V. I. and BERGEL'SON, L. D.,
Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of
Sciences, Moscow

[Abstract] Properties of perylenoyl-labelled lipids were described; they were compared with anthryl-labelled lipids and the possibility of combined use of these two forms of lipid probes in membrane studies was discussed. Perylenoyl-labelled lipids were easily incorporated into the lipid bilayer with the fluorophores being localized in the hydrophobic region of the membrane. Perylenoyl fluorophore has a high quantum yield and its fluorescence parameters permit its use as an acceptor of excitation energy of 9-anthryl fluorophore, formerly used for fluorescent labelling of lipids. Combined use of perylenoyl-labelled and anthryl-labelled lipids extends the possibility of studying lipid-lipid interactions in biological membranes, including the tracking of intermembrane transfer of lipid molecules. The capacity of 3-perylenoyl residue to change the position of the emission peak as a function of the polarity of the environment makes them useful for comparing membrane permeability for water. Perylenoyl compounds were also found to be effective fluorescent dyes for use in cytological studies. Figures 7;
references 26: 5 Russian, 21 Western.

[1561-2791]

UDC 577.3

OSCILLATORY PROCESSES OF OXIDATION OF LIPIDS INDUCED BY ULTRA-VIOLET RADIATION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 277, No 1, Jul 84
(manuscript received 23 Jan 84) pp 230-234

ZAMORIN, O. V., Scientific Research Institute for Biological Testing of Chemical Compounds, Staraya Kupavna, Moscow Oblast (Article presented by N. M. Emanuel, 26 Dec 83)

[Abstract] The course of the dark stage of ultra-violet induced oxidation of phospholipids (FL) and arachidonic acid (AK) was described. FL samples in solution in ethanol or in a suspension in water were irradiated by the complete spectrum of a Xenon lamp for 5-300 s while mixing and the optical density (D) of the sample was recorded spectrometrically 10 seconds after irradiation. Irradiation of the FL or AK samples produced oscillation of D in the 210-270 nm range with maximum amplitude at 233 nm with gradual decay. Oscillations were basically aperiodic relaxation oscillations. Periodic oscillations interspersed the aperiodic oscillations and reirradiation after

oscillation damping produced oscillations with the same period. Additional mixing after irradiation of the entire volume prevented rise of oscillations and oscillation stopped after mixing of the sample. Rise of oscillations required an ultra-violet component shorter than 260 nm. It was assumed that irradiation of oxidized FL samples forms an active compound which is unevenly distributed throughout the cells and which has the capacity to react chemically with existing products. Diffusion of this compound initiated a reaction and the uneven distribution of it along the cells produces oscillations of optical density since photolysis always reduces D in the spectral range of oscillations and therefore the chemical heterogeneity must be connected with uneven optical density. Thus, the existence of a dark stage of oxidation of initially oxidized FL and AK was confirmed. Oxidation of FL by liposome may be accompanied by further conversion of products of peroxide oxidation of lipids, the presence of which requires spatially irregular distribution of the chemical components. Figures 4; references 6: 2 Russian, 4 Western.

[1548-2791]

UDC 579.25.57:575.13

PRODUCTION AND CHARACTERISTICS OF THERMOSENSITIVE PLASMID pRP19.6--DERIVATIVE OF RPI CONTAINING DUPLICATED SEQUENCE IS21

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 18, No 4, Jul-Aug 84
(manuscript received 13 May 83) pp 1111-1120

DANILEVICH, V. N., KOSTYUCHENKO, D. A., NEGRIY, N. V. and SHTANNIKOV, A. V., All Union Scientific Research Institute of Applied Microbiology, Serpukhov, Moscow Oblast

[Abstract] The structure and properties of thermosensitive plasmid pRP 19.6 with the ability of highly effective integration into chromosome E. coli was studied. This plasmid is a derivative of the mutant RPIts12 containing partially inactivated transposon Tn1 isolated from the cells of the derivatives of *Pr mirabilis* carrying RPI ts 12. On the basis of an analysis carried out, it followed that the plasmid pRP 19.6 was a thermosensitive analogue of R68.45 factor isolated from the *Ps. aeruginosa* cells. This plasmid contains two copies of IS21 sequence and mobilizes efficiently the nonconjugative pBP 325 plasmid. The insertion of pRP 19.6 into E. coli chromosome is a process independent of the functional activity of the gene rec A and exceeds the insertion frequency of RPI plasmid by an order of magnitude. It was established that transport of chromosomal bacteria genes with R68.45-like plasmids occurs via formation of cointegrative replicons. Possible use of pRP 19.6 for insertion inactivation of chromosome genes was discussed along with isolation of Hfr-strains in a broad range of gram-negative bacteria. Figures 5; references 17: 6 Russian (1 by Western author) 11 Western.

[1588-7813]

UDC 547.963.9;547.858.9

DIRECTED MODIFICATION OF A PLASMID pBR322 Tc^r GENE REGION BY COMPLEMENTARY SINGLE STRANDED DNA FRAGMENTS CARRYING ALKYLATING GROUPS

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 18, No 4, Jul-Aug 84
(manuscript received 28 Apr 83, after revision 24 Oct 83) pp 1081-1089

MAZIN, A. V., DIANOV, G. L., SAFRONOV, P. F. and SALGANIK, R. I., Institute of Cytology and Genetics, Siberian Department of USSR Academy of Sciences, Novosibirsk

[Abstract] The goal of this study was to develop a method of directed modification of DNA target molecule with alkylating DNA derivatives which would make it possible to use the locally alkylated DNA target molecules for an *in vivo* insertion and to obtain the mutations resulting from directed modifications as well as to be able to analyze them. As a model of target the gene was selected in pBR 322 plasmid determining resistance to tetracycline (Tc^r). Srf DNA was prepared by partial digestion of a double stranded EcoRIBamHI restriction fragment from Tc^r by *E. coli* exonuclease III. Polyfunctional alkylating agent N,N,N'-tri(β -chloroethyl)-N'-(*p*-formulphenyl)propylene-diamine-1,3 was added to 4-5% of bases from such DNA and thus-modified DNA was hybridized with supercoiled DNA from the plasmid pBR 322. Mild hybridization conditions were found which did not lead to splitting of the alkylating groups. About 20% of pBR 322 plasmids formed hybrid complexes under these conditions (yielding D-loops). Modified single strain DNA derivatives alkylated the complementary region of plasmid DNA forming a covalently bound D-loop resistant to degradation. Figures 5; references 19: 7 Russian (1 by Western author), 12 Western (1 by Russian authors).

[1588-7813]

UDC 577.2.34.15.17.25

REACTION OF DNA WITH LOW MOLECULAR LIGANDS OF DIFFERENT STRUCTURES.
COMMUNICATION 3. DNA COMPLEXES WITH DISTACTINS

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 18, No 4, Jul-Aug 84
(manuscript received 3 May 82, after revision 30 Dec 82) pp 950-956

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[Abstract] DNA complexes with distactins were investigated. Distactins can be considered structural analogues of actinomycin type bifunctional compounds consisting of two heterocyclic chromophores connected with a hydrocarbon or polymethylenopolyamine chain. Depending on the chain length, one or two chromophores may interact with DNA base pairs. Distactins contain oligopeptide groups of the distamicine type in 1,9 positions of the phenoazene

chromophore which may include from one to three fragments of 1-methyl-4-amino-2-pyrrolecarboxylic acid. Using spectrophotometric, viscosimetric and flow birefringence methods, it was shown that the binding of distactins in aqueous solutions depended on the number of methylpyrrole rings in peptide groups: in case of one or two rings interaction,--externally bound complexes with DNA are formed; with three rings the DNA double helix is joined by means of oligopeptide groups from the outside of the molecule. During intercalation, the chromophore and methylpyrrole react with DNA. Figures 6; references 24: 13 Russian, 11 Western (1 by Russian authors).
[1588-7813]

UDC 577.182:577.352.465:543.422.25

DOUBLE HELICAL CONFORMATION OF GRAMICIDIN A

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 1, Jan 84
(manuscript received 26 Oct 83) pp 5-17

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[Abstract] Two-dimensional ¹H-nuclear magnetic resonance spectroscopy was used to determine the conformation of form 3 of gramicidin A in a dioxane solution. Nuclear magnetic resonance spectra (COSY, RELSY, NOESY) were obtained at 500 MHz on a WM-500 Bruker nuclear magnetic resonance spectrometer. Analysis of the entire aggregate of nuclear magnetic resonance data showed clearly that the 3 gramicidin A conformation in dioxane is a left handed antiparallel double helix with 5.6 residues per turn ($\text{N}_{\text{H}} \pi \pi_{\text{LD}}^{5,6}$). Structural properties of gramicidin A form 3 satisfied requirements for the spatial structure of the transmembrane channel. Comparison of data obtained in this study with results of a study by Urry et al. showed disparities between the findings in these 2 studies. Figures 8; references 34: 2 Russian, 32 Western.

[1561-2791]

UDC 577.3

OXIDATION OF LIPOSOMES

Moscow DOKLADY AKADEMII NAUK SSR in Russian Vol 276, No 6, Jun 84
(manuscript received 23 Jan 84) pp 1500-1503

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[Abstract] A study was made of the possibility of assay of products of peroxide oxidation of lipids in liposomes based on the magnitude of the optical density of a suspension of liposomes. In addition, an attempt was made to use spectrophotometry to study the dark stage of UV-induced oxidation (Lyumen-3M instrument) of liposomes. The liposomes were prepared from phospholipids (Batzri, Korn, 1973), (in turn obtained by the Blait procedure, 1959). The liposomes were oxidized by exposure to air or to UV-light. Degree of oxidizability of the liposomes was assayed based on values of optical density at 233 nm. Optical density and absorption spectra were recorded on a Hitachi-220 spectrophotometer. It is reported that change in the absorption spectrum of the liposome suspension following spontaneous or UV-induced oxidation of liposome lipids unequivocally points to an accumulation of oxidation products in the suspension; however, to determine the true value of the optical density of these products it is necessary to resort to a solution of liposomes because modifications to light scattering for the value of the optical density of the suspension are inadequate. In the dark stage of UV-induced oxidation of liposomes, with a low content of products of oxidation in them, further accumulation of these products, uniformly with respect to time, takes place. Figures 3; references 6: 2 Russian, 4 Western.
[1544-8586]

UDC 577.175.52:543.422.23

EFFECTS OF PROSTAGLANDINS ON STRUCTURE AND PERMEABILITY OF LIPID BILAYER

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 5, May 84
(manuscript received 27 Jan 84) pp 478-486

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[Abstract] ^1H , ^{13}C and ^{31}P NMR spectroscopies were used to evaluate the effects of prostaglandins (PG) on the structure and permeability of liposomes constructed of phosphatidylcholine. The PG molecules were localized to the glycerol moieties in the bilayer, without involvement of the hydrocarbon chains and without altering the mobility of the polar phosphatidylcholine heads. Even in the presence of high PG concentrations--4 mole% relative to phosphatidylcholine--the organization of the bilayer membrane was not

affected, while even low PG concentrations (10^{-5} M) enhanced Mn^{++} transport, according to ESR data. PGs were deemed to form 1:1 complexes with Mn^{++} and, in terms of increasing the permeability to Mn^{++} , were ranked as follows: 11,9-epoxymethano-PG-H₂>PG-E₁>15-fluoro-15-deoxy-PG-F_{2α}>PG-F₂,E_{2α}>PG-A₂. Concomitant determinations of the energies of activation for Mn^{++} transport showed respective values of 105, 97 and 90 kJ/mole for PG-F_{2α}, 15-fluoro-15-deoxy-PG-F_{2α} and 11,9-epoxymethano-PG-H₂. These observations suggest that nonspecific bonding of PGs to plasma membranes does not alter their molecular organization, but may exert an ionophoric effect. Figures 4; references 23: 6 Russian, 17 Western.

[1565-12172]

UDC 577.352.26

ADSORPTION OF AMINOADAMANTANE DERIVATIVES ON BILAYER LIPID MEMBRANES:
EFFECT ON ELECTRIC FIELD DISTRIBUTION

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 5, May 84
(manuscript received 29 Nov 83) pp 516-523

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[Abstract] Seven aminoadamantane derivatives--1-aminoadamantane.HCl (I), α-methyl(1-adamantylmethylamine).HCl (II), α-ethyl(1-adamantylmethylamine).HCl (III), 1-(2-mercaptoethylamino)adamantane.HCl (IV), S-[N-(1-adamantyl)-aminoethyl]isothiuronium.HBr (V), 2-[(3,5,7-trimethyl-1-adamantyl)methyl-amino]ethanol.HCl (VI, and 1-(2-hydroxyethyl)aminoadamantane.HBr (VII)--were tested for the extent of their adsorption to bilayer lipid membranes and effects of electric field distribution in the membranes and correlated with their antiviral activity against influenza A. Adsorption of the derivatives to membranes prepared from total lipid of bovine brain and bacterial phosphatidyl-ethanolamine led to changes in boundary potentials (jumps in potential between the membrane and aqueous solvents), as measured by intramembranous field compensation method. Measurements of the boundary potential led to calculations of adsorptivity (I < VII < II < VI < III < IV < V) and adsorption constants in 10^{-1} M NaCl. Adsorption of the derivatives to the bilayer lipid membrane affected only the potential of the diffusional zone of the membrane, indicating that the positively charged groups were located on the surface of the membrane. There was no correlation between adsorptivity and antiviral activity, indicating that factors other than changes in the boundary potential of a membrane are involved in antiviral activity. Figures 6; references 11: 7 Russian, 4 Western.

[1565-12172]

UDC 612.815; 595.77

MECHANISMS IN ACTIVATION AND BLOCKING OF GLUTAMATE-SENSITIVE POSTSYNAPTIC MEMBRANES

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 2, Feb 84
(manuscript received 27 Jul 83) pp 130-140

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[Abstract] In view of the paucity of data on the glutamate ion channels, a study was made of glutamate-activated ion channels in the neural system of Calliphora erythrocephala larvae. Amplitude of evoked postsynaptic current, which lasted from 4 to 7.9 msec depending on membrane potential, increased linearly with the strength of the excitatory stimulus, indicating that each cell is innervated with several axons; at supramaximum levels, amplitude remained constant. As L-glutamate was administered a gradual decrease in excitatory postsynaptic current was observed. Glutamate desensitization occurred with prolonged administration. Administration of concanavilin A eliminated desensitization. Mean time for the open state of the synaptic channels following administration of glutamate was 5.8±0.1 msec at a membrane potential of 65 millivolts at 21°C. Concanavilin A slightly reduced the duration of open state. Chemical formulas are shown for two substances that acted as blockers in the glutamate channels, proving to be 100 times more powerful than tubocurarine or chlorisondamine. Figures 8; references 23: 1 Russian, 22 Western.

[1562-964]

UDC 535.378: 577.335: 577.336: 591.111.1

STUDY OF MICROHETEROGENEITY IN ERYTHROCYTE MEMBRANES USING LIPID-SPECIFIC FLUORESCENT PROBES. EFFECT OF CHOLESTEROL AND PROSTAGLANDIN E₁

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 2, Feb 84
(manuscript received 6 Aug 83) pp 145-152

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[Abstract] Although red cell membranes have been extensively studied, the question of the existence in them of phospholipid-enriched domains remains unclear. In order to clarify this matter a study was made of the status of individual classes of phospholipids in biological membranes using fluorescent anthryl-labeled phosphatidylcholine and sphingomyelin probes. The effects of

cholesterol and prostaglandin E₁ on the molecular organization of the phosphatidylcholine and sphingomyelin were examined in rabbit red cell membranes from normal subjects, membranes from normal animals cholesterol-loaded in vitro, and membranes from rabbits with experimental hypercholesterolemia. In normal membranes, segregation of the phosphatidylcholine and sphingomyelin did not occur. Higher concentrations of cholesterol led to some lipid segregation and altered the degree of polarization in the two probes, raising it in the sphingomyelin and lowering it in the phosphatidylcholine. In hypercholesterolemia, polarization of the sphingomyelin probe was marked, reaching values double that of the phosphatidylcholine probe. This was the first demonstration that in rabbit red cell membranes enriched with endogenous or exogenous cholesterol, phosphatidylcholine and sphingomyelin are segregated. Prostaglandin E₁ also induced similar effects. When membranes were treated with both cholesterol and prostaglandin E₁ heterogeneity was increased even more, with the formation of discrete lipid clusters. Figures 2; references 25: 4 Russian, 21 Western.

[1562-9642]

UDC 577.352.465 + 612.42

MEMBRANE POTENTIAL IN HUMAN PERIPHERAL LYMPHOCYTES. FACTORS DETERMINING MEMBRANE POTENTIAL

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 2, Feb 84
(manuscript received 7 Jul 83) pp 191-199

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[Abstract] Values for membrane potential in human peripheral lymphocytes were evaluated using a 3,3'-dipropylthiodicarbocyanin fluorescent probe, and the contribution of K⁺, Na⁺ and Cl⁻ ions to membrane potential was studied. It was found that membrane potential in the peripheral lymphocytes depends more on the concentration of K⁺ ions than of Na⁺. It was shown that these membranes are more permeable to the K⁺ ion than the Na⁺ ion. Values for resting membrane potential were found to vary between - 55 and - 60 mV. The relationship between sodium and potassium permeability (P_{Na}/P_K), determined from the values for ion flow through the cell membrane, was calculated at approximately 0.02. $P_{Cl}/P_K = 0.13$. The contribution to membrane potential made by active transport was determined by adding the Na⁺, K⁺-ATPase inhibitor ouabain, which failed to alter membrane potential, demonstrating that the contribution from Na⁺, K⁺-ATPase is negligible. Intracellular concentrations of Cl⁻ in lymphocytes was much higher than expected. Some 80% of intracellular Cl⁻ is thus moved into the cell by active transport. Figures 4; references 36: 6 Russian, 30 Western.

[1562-9642]

BIOTECHNOLOGY

UDC 581.1

METHODS FOR DETERMINATION OF CYTOKININS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 6, Jun 84
(manuscript received 25 Oct 83) pp 77-86

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imeni Avgust Kirkhenshteyn, Latvian SSR Academy of Sciences

[Abstract] A review of largely Western literature is presented on some current problems in cytokinin research, with primary emphasis placed on bioassay methods. The cytokinins are natural derivatives of adenine and of its ribotides and ribosides. They have been identified in most plants and microorganisms, and in certain animals. They exist either free or bound to glucose or amino acids. A variety of bioassays have been improvised for cytokinin detection and quantification, including their effects on cell division in radish cotyledons, protonemal cell division and induction of gametophores in Ceratodon and Funaria sp., effects on betacyanin synthesis in Amaranthus, and so forth. More recent advances have seen the development of specific chromatographic and spectrophotometric methods of analysis, and the use of various spectroscopic techniques. The latest entry in the analytic armamentarium for cytokinins is represented by various radioimmunoassays. Figures 2; references 83: 1 Ukrainian, 15 Russian, 67 Western.

[758-12172]

ENVIRONMENT

STEPPE ENCROACHMENT ON ARAL SEA AND AMU DARYA DELTA

[Editorial Report] Tashkent SOVET OZBEKISTONI in Uzbek 1 April 1984 carries on page 4 a 300-word report from UzTAG titled "Protective Afforestation of the Amu." The report states that more than half a million hectares of fertile land on the shores of the Aral Sea and the delta of the Amu Darya are threatened by the encroachment of steppe sands. Moreover, the level of the Aral Sea continues to drop, the area temperature is increasingly hot, and the soil is turning poor and saline. Trees are already being planted on the north shore of the Aral to protect it from encroaching sands. Specialists of the Central Asian Irrigation Scientific Research Institute have produced a scheme for diverting to the delta drainage water from the southern region of Karakalpakistan and river collector water from Khorezm Oblast and Tashavuz Oblast in Turkmenistan. After the chemicals are removed from this water, whose total volume could reach 3.5-4.0 cubic kilometers, it could be used for agricultural purposes, regulating the level of the Aral Sea, and ensuring that the delta land doesn't dry up. The plan provides for agricultural and fishing interests to utilize water from Sudoch'ye Lake in the northwest area of the delta and from Karatereng Lake on the edge of the Kyzylkum. According to specialists, the slightly mineralized water of these lakes is usable for irrigation of rice and other crops and for fish farming. The specialists also recommend building a freshwater reservoir in Davudkul where 500 million cubic meters water could be collected for various economic uses.

ENVIRONMENTAL POLLUTION BY TRACE ELEMENTS AND HYDROCARBON COMPOUNDS FROM
BURNING BROWN COAL

Prague ZHURNAL GIGIYENY EPIDEMIOLOGII MIKROBIOLOGII in Russian Vol 28,
No 2, 1984 (manuscript received 1 Dec 82) pp 137-147

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[Abstract] Data from measurement and analysis of emissions from almost all major coal-burning electric power plants in Czechoslovakia from 1975-1981 were used to determine quantitative and qualitative effect of microelements on the biosphere. Elements As, Be, Cd, Co, Cr, Cu, F, Hg, Mn, Ni, Pb, Se, V and Zn were included in the study. The wide spectrum of hydrocarbons found in condensates from coal-burning power plants indicated the passage of pyrolytic process (the mechanism of which is not completely understood) as well as combustion processes. In addition to organic substances, the condensate contained a large quantity of fluorine compounds (to an order of magnitude of 1/100th mg.l⁻¹ of condensate) which may play a major role in environmental damage originating at coal-burning electric power plants. The fluoride level in precipitations usually exceeded that in surface water and ground waters of Czechoslovakia. Production of 100 megawatts of electricity produced 168 m³ · sec⁻¹ of waste per production unit. This amounts to 5·10⁹m³ of waste annually. Comparison of measured inorganic emissions from brown coal combustion in USA power engineering and CSSR power engineering is presented and discussed with respect to As, Be, Cr, Hg, Mn, Ni, Pb, Se, Va and Zn emissions. Figures 1; references 38: 1 Russian, 37 Western.

[1582-2791]

EPIDEMIOLOGY

UDC: 576 890/575.4/

ENDEMICITY OF PROTOZOAN DISEASES IN TURKMEN SSR

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK
in Russian No 1, 1984 (manuscript received 27 Sep 83) pp 12-18

[Article by A. S. Berdyyev, Institute of Zoology, Turkmen Academy of Sciences]

[Text] The expeditions of Academician Ye. N. Pavlovskiy to Turkmen SSR in 1930-1933 laid the foundation for studying protozoan diseases of man and animals in this republic. The first of these expeditions was to Murgab in 1930, to control transmissive protozoan invasions. Subsequently, N. I. Latyshev and A. P. Kryukova, colleagues of Ye. N. Pavlovskiy, were the first to solve the basic problems of epidemiology of cutaneous and visceral leishmaniasis. The second expedition (1931) to Kara-Kala and Kizyl-Atrek was organized by the Council for the Study of Productive Forces (SOPS) under the USSR Academy of Sciences and the Narkomzdrav [People's Commissariat of Public Health] of Turkmen SSR. It studied the epidemiology of malaria, tickborne relapsing fever, the ecology of malaria mosquitoes and ticks of the genus Ornithodoros, defined the species composition of mosquitoes, screened the inhabitants and domesticated animals for helminth invasions. The third was the expedition to the Kushka region (1933) and was concerned with the role of insects in epidemiology of acute intestinal diseases occurring in the summer, and it developed measures to control them.

The results of these studies and, mainly, of investigation of zoonotic dermal leishmaniasis were of deciding significance to establishment by Ye. N. Pavlovskiy of the teaching in endemicity of transmissive diseases of man and animals. Leishmaniasis and coccidia will be discussed in other articles, so that we shall dwell on other endemic protozoan diseases of man and animals.

Toxoplasmosis is an anthropozoonotic disease, which is one of the causes of miscarriage, birth of unviable offspring with diverse deformities, damage to the central nervous system, organs of sight, lymphatic and endocrine systems of adult animals, as well as humans. The pathogen of this disease is Toxoplasma gondii. The range of intermediate hosts of this parasite is quite broad: man, most mammals and birds. Representatives of the Felidae family are the principal hosts of toxoplasma. In the Soviet Union, regular investigation of toxoplasmosis began at the instigation of Academician of Ye. N. Pavlovskiy at the Institute of Medical Parasitology and Tropical Medicine imeni Ye. I. Martsinovskiy by D. N. Zasukhin and S. G. Vasina. In 1957,

this work was continued at the Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, where a toxoplasmosis laboratory was formed in the Department of Endemic Infections.

Ye. N. Pavlovskiy commented with satisfaction about the research that was started on toxoplasmosis of animals and several endemic diseases by Kazakh scientists headed by I. G. Galuzo. There was particular increase in interest in the problem of toxoplasmosis in the years that followed. All-Union and international conferences, symposiums, etc., were held dealing with toxoplasmosis. Many scientific research institutions and VUZ's of the Soviet Union were concerned with various problems of toxoplasmosis. Major advances were made in epidemiology, epizootiology, diagnostics, pathogenesis, prevention, control measures and many other aspects of the toxoplasmosis problem. However, in recent years, there was appreciable decline of such interest. It was noted in the resolution adopted by the Third Congress of VOPR [All-Union Society of Protozoologists] (Vilnius, 21-24 September 1982) that "... in the last 5 years there has been a noticeable decline of research and therapeutic-preventive work dealing with toxoplasmosis (special toxoplasmosis laboratories were closed, the number of publications and scientific research topics decreased, etc.). This decline has no objective basis, since toxoplasmosis is, as before, widespread in our country...."

Investigation of endemicity of toxoplasmosis revealed that there were spontaneous toxoplasma carriers among 137-145 species of birds representing 16 orders and 293-301 species of mammals referable to 12 orders. Parasitological methods demonstrated the pathogen in 51-54 bird species and 172-175 mammalian species. The parasite was found in the natural habitats of most species [15].

As the entire range of possible hosts for the parasite was disclosed, we gained an idea about the routes of its circulation in nature. Work on endemicity of toxoplasmosis has been pursued in Turkmen SSR since 1965 [1, 2, 3, 9]. Toxoplasma carriers have been established serologically among the following: long-eared hedgehog, shrew, Afghan pika, long-clawed ground squirrel, small five-toed and northern three-toed jerboa, little earth hare, house mouse, red-tailed Libyan jird; tamarisk, midday and great gerbils; Indian lamellar-toothed rat, mottled polecat, common fox, Caucasian agama [lizard], yellow-bellied lizard, Horsfield's terrapin, pond tortoise, rock-dove, bald coot, white wagtail, reed bunting and white-bellied starling.

We found [1, 2, 9] endemic sites for toxoplasmosis in all climate zones of Turkmenia. Toxoplasma carriers were found among animals living in sand, foothills and mountains, and in the latter case the percentage of animals with positive reactions was slightly higher than animals of the sandy zone. It was established that biogeocenoses formed along irrigation canals, around various bodies of water formed by drainage, filtration and run-off waters are favorable for circulation of the pathogen of toxoplasmosis. Development of desert territories and appearance of new populated centers are instrumental in formation of anthropuritic toxoplasmosis sites. In the sandy desert, where wells are the only sources of water, the territory around these wells, being the place where farm and wild animals converge to water, plays an important part in preservation of the toxoplasma oocyst in soil and transmission to

other animal species. The role of water and soil was demonstrated in toxoplasma infection of aquatic birds, wild and domestic animals, as well as the role of each wild animal species in epizootiology and epidemiology of toxoplasmosis in Turkmen SSR. The greater gerbil was found to be the main carrier of toxoplasma among the tested rodents in the plain region of this republic. Experiments revealed that the greater gerbil and red-tailed Libyan jird are susceptible and highly sensitive to oocysts of a toxoplasma strain that is avirulent for mice [3]. Analysis was made of toxoplasmosis infection according to species and habitat of animals--carriers of antibodies, their ecology, age, sex and season when study was made.

Sarcocystosis is a zoonotic disease characterized by formation of cysts in striate muscles and other tissues of many species of mammals, birds and reptiles. The pathogen of this disease is a parasitic protozoan of the genus *Sarcocystis*, which was found in 109 species of mammals, 72 species of birds and 11 species of reptiles [24]. To date, several new animal species have been added to this list. Sarcocysts are also parasites in man.

They have strict host specificity. The sexual and even asexual phases of their development are related to specific hosts. For example, in sheep two species of sarcosysts were found, the definitive hosts of which are the cat and dog. In cattle there are three parasite species, in swine two and in horses one. There can be two parasite species in man, from swine and cattle.

The study of sarcocysts and the disease they cause is of great theoretical and practical importance. In the resolution of the Third Congress of VOPR it was noted that "... investigation of sarcosporidia, the pathogenic significance of which had been underestimated until recently, merits special attention."

The distribution of sarcocysts among domestic and wild animals of Turkmen SSR has been studied since 1977 [5, 8]. In 1978-1982, impression smears of the myocardium taken from 857 farm animals from 26 regions of Turkmen SSR were examined. Examination was made of the esophagus from 35 carcasses of cattle and 175 sheep. Cystozoites of sarcocysts were discovered in myocardium smears from sheep (90.8%), cattle (93.3), swine (15.5) and camels (18.5). Macrocyts were found in 21.1% of the tested sheep and 22.9% of the cattle. Infection of domestic animals in different regions of the republic is in the range of 4.2-100%. Sarcocysts have been found in domestic animals in the mountain and plain regions of this republic. Such widespread distribution of sarcocysts among domestic animals, and in areas where their definitive hosts (dog, cat) are few in number, indicates that apparently predatory mammals (wild felines, jackal, fox, wolf, mottled polecat, etc.) are involved.

Among the wild mammals of Turkmenistan, we found sarcocysts in the Pamir argali [sheep], wild goat, small five-toed jerboa, social vole, common field-mouse, midday, red-tailed and greater gerbil, and the bald coot. The cystozoites ["cystozoids"] in the argali and wild goat are very similar in shape and size to those of sheep. Perhaps they are referable to the same species. To confirm this, the definitive host must be identified for the sarcocysts of the argali and wild goat, and cross infection must be performed of sheep, argali and wild goat. Morphometric data are submitted on the cysts and cystozoites from different species of wild animals. The sarcocysts of gerbils (midday,

red-tailed and greater) differ insignificantly from one another in appearance and localization of macrocysts, as well as morphology of cystozoites. In order to identify the species, it is necessary to find the definitive host of pathogens in each gerbil species and perform cross infection between gerbils. Using information in the literature and the results of our own studies, we developed an arbitrary chart of sarcocyst circulation in nature [8].

Tickborne relapsing fever is an acute transmissible disease that occurs in the form of accesses of fever. This endemic disease is widespread in countries with a hot climate. Spirochetes of the genus *Borrelia* are the pathogen. Some researchers (Shaudin, 1905) have reported on the protozoan nature of spirochetes. The grounds for this are the presence in them of undulating rods and lengthwise division. Other authors classify spirochetes as bacteria, and others yet as algae (quoted in [22]). At the present time, they have been classified as the *Protophyta* type (*Spirochetalis* order). Evidently, spirochetes occupy an intermediate position between bacteria and protozoans.

In the Soviet Union, studies of tickborne relapsing fever and ticks of the genus *Ornithodoros*, which are spirochetes vectors, started in 1926-1930 in Central Asia. This work was headed by Ye. N. Pavlovskiy. Of particular value then was the research of N. I. Latyshev who established through testing on himself, the role of Central Asian ornithodoros in transmission of tickborne relapsing fever. N. I. Latyshev, who worked in Turkmenia, discovered spirochetes in some wild mammals—greater and red-tailed gerbil, long-clawed ground squirrel, horseshoe bat and common noctule [great bat]. He inoculated himself with the blood of the greater gerbil and established the pathogenicity of spirochetes from this animal to man. In 1927, I. A. Moskvin demonstrated that guinea pigs are susceptible and highly sensitive to spirochetes [18, 19, 20].

The endemic sites of this disease are inherent in most landforms of Turkmen SSR. In the desert regions, biocenoses with *O. tartakowskyi*, vector of *B. latishevi*, are of predominant relevance, whereas *O. papillipes*, the vector of *B. sogdiana*, is encountered more regularly in the foothills and mountain regions, along river valleys, along the Uzboy and in the ruins of ancient settlements. Spirochetes are often isolated from *O. papillipes* ticks collected in burrows and shelters of large animals (porcupine, badger, fox), in caves visited by large animals, as well as in ruins of ancient cities and settlements [20, 21].

We discovered [9] spirochetes in blood smears from greater gerbils caught in the environs of the Sovkhoz imeni 9 Ashkhabad Commissars, in the foothills in the region of Ashkhabad, in the Meshkhet sands and sands in the region of Lake Kelte-Beden (25 km southeast of the Zakhmet Station).

Thus, the presence of vector ticks and discovery of the pathogen in warm-blooded animals are indicative of the existence of endemic sites for tickborne relapsing fever in different landforms of Turkmen SSR.

Since the parasitocenoses of wild animals also include pathogens that are potential pathogens of diseases of man and domestic animals, the study of "diseases of wild animals" [11] was added to the teaching on endemicity. In

Turkmen SSR, studies of blood smears and viscera of wild mammals and birds revealed parasitic protozoans: Trypanosoma, Nuttallia, Hepatozoon, Grahamia, Anaplasma, Hemoproteus and Leucocytozoon.

Genus Trypanosoma Grube, 1842. The first trypanosoma findings in rodents were made in 1879 by Lewis, who discovered them in the blood of *Rattus decumanus* and *R. rufescens* from India [12]. G. Ya. Zmeyev [16] found Trypanosoma in rodents in Turkmenia. N. I. Latyshev [19] found them in the mouse, "nezokia" [?] and ground squirrel in the Murgaba Plain. We [6] found Trypanosoma in blood smears from little earth hares caught in the region of Donguzadzh and Malyy Delili lakes. In Turkmenia, they were also found and described in camels [17]. Morphologically, the Trypanosoma from the little earth hare and camel are similar, but cross infection must be performed to confirm that they are related.

Genus Nuttallia Franca, 1910. Nuttallia was first found in the hedgehog by V. L. Yakimov in 1908 (in *Erinaceus europeus*), in Saratov, and then in 1909 by I. M. Lus in Transcaucasia, in 1930-1934 by D. N. Zasukhin in Kazakhstan, the Ukraine, Saratov Oblast (quoted in [14]) and other parts of the Soviet Union. In Turkmen SSR, Nuttallia was found in hedgehogs and described only once, in the floodplain of Tedzhen River [4].

Genus Hepatozoon Miller, 1908. Representatives of this genus are distributed among wild and domestic animals in different countries of the world. Most of them are leukocyte parasites and some are found in erythrocytes of different mammals [14, 19, 22, 25, 26].

In Turkmen SSR, Hepatozoon was found in red blood cells of gerbils, and less often in ground squirrels [19]. A. S. Berdyyev [4, 6, 9] observed it in the great gerbil, little earth hare, small five-toed jerboa and house mouse caught in 10 sites in the republic. He provided the morphometric characteristics of the parasites, demonstrated infection of great gerbils with hemoparasites (Hepatozoon, Grahamia, Microfilaria) as related to season, habitat, age and sex [6].

Genus Grahamia Tartakowskyi, 1910, is comprised of rod-shaped organisms that are markedly stained in red. They are found in red blood cells of mammals. The question of systematic position of Grahamia is still debatable. There is an extensive survey of Grahamia in the works of D. N. Zasukhin [14] and N. I. Dyl'ko [13]. In Turkmen SSR, these blood parasites have been found in Brandt's hedgehog, little earth hare, field and house mice, gray hamster, midday, red-tailed and great gerbils [4, 6, 9]. They have also been found in animals inhabiting all landform zones of this republic.

Genus Anaplasma Theiler, 1910. This is a punctate parasite of mammalian erythrocytes consisting virtually of a single chromatin. There are different opinions about the nature of these organisms.

Anaplasma and anaplasma-like organisms were discovered in some representatives of mammals [13, 14, 22]. In Turkmen SSR, anaplasma-like elements were found in erythrocytes of the long-eared and Brandt's hedgehogs, small five-toed jerboa, little earth hare, "nezokia," field and house mice, midday, red-tailed and great gerbils [4, 6].

Genus *Haemoproteus* Kruse, 1890, is comprised of parasites of endothelial cells of blood vessels of birds at one stage of their development, in elements of circulating blood at another stage and in tissues of invertebrates at the sporogonia stage. The first representative of this genus was found in 1889 in birds by V. Ya. Danilevskiy. There is extensive information about them in the works of Wenyon [26], V. L. Yakimov [22], L. P. Burtikashvili [10] and other authors. Representatives of this genus were first demonstrated in Turkmen SSR by us with regard to 23 bird species. The nightjar, dunlin, bluethroat and plover were observed as new *Hemoproteus* hosts. An ecological and faunistic analysis was made of blood parasites of wild birds. It was established that bird infection by hemoparasites depends on host migration. The extensiveness of invasion of birds by *Hemoproteus* constitutes 19.5% [7].

Genus *Leucocytozoon* Danilewskyi, 1890, consists of nonpigmented parasites of formed elements of blood, the sporogonia of which originate in vectors--gnats of the Simuliidae family. Schizogonia are seen in viscera of birds. Representatives of this genus are rather widespread among wild and domestic birds. Parasites of this species were first detected by V. Ya. Danilevskiy (1884-1886) in the blood of various predatory birds [7]. Subsequently, they were found in birds in many countries of the world. Thus, according to data in [23], *Leucocytozoons* referable to 67 species were found in 146 bird species. At present, the list of birds has been augmented with several new species. In Turkmenia, *Leucocytozoon* has been discovered in 21 bird species, and some of them have been described [7].

Thus, it was demonstrated that some protozoan diseases of man and animals are endemic in Turkmen SSR. The fauna of parasitic protozoans of wild animals has been identified. It was established that there can be combinations of two, three or more infections and invasions. According to our preliminary estimates, the great gerbil is a carrier of more than 100 parasites. This circumstance is of great importance, particularly in our republic, where endemic sites for plague have existed for a long time. For this reason, it is important to answer questions related to the course of diseases in wild animals infected by several parasites at once: in what combinations could disease not be manifested, in what instances it can lead to weakening of the organism, activation of one of the parasites, which leads to outbreak of epizootics, etc. It is imperative to continue studies of endemic sites of protozoan diseases and detection of parasitofauna of wild mammals and birds in Turkmen SSR in accordance with the teaching of Ye. N. Pavlovskiy on endemic sites of transmissive diseases and problem of parasitocenoses.

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STUDY OF BLOODSUCKING TICKS IN TURKMENISTAN IN LIGHT OF TEACHING
OF ACADEMICIAN YE. N. PAVLOVSKIY

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK
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[Article by A. Berdyyev, A. Amanguliyev and M. A. Meledzhayeva, Institute of
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[Text] Bloodsucking ticks as the specific vectors of the pathogens of many dangerous transmissible diseases of man and farm animals became known thanks to the systemic and purposeful endeavors of Academician Ye. N. Pavlovskiy and his disciples. In our brief report, we offer a survey of data pertaining to investigation of Ixodes ticks, Gamasid and Trombiculid [chigger] mites in Turkmen SSR.

At the present time, about 150 species and subspecies of bloodsucking acarids are known in the fauna of Turkmen SSR.

The first information about the Ixodes tick fauna inhabiting the territory of the USSR appeared in the fundamental work of A. A. Biruli published in 1895 in IZVESTIYA PETERBURGSKOY AKADEMII NAUK [News of the Petersburg Academy of Sciences]. However, their systematic study began only in 1924 by a team of parasitologists headed by Ye. N. Pavlovskiy. The results of these studies were published in the works of Ye. N. Pavlovskiy, N. O. Olenov, B. I. Pomerantsev, I. G. Galuzo and G. V. Serdyukova (1928-1956). This work was instrumental in further investigation of Ixodes ticks in Turkmenistan also.

Ye. N. Pavlovskiy, P. A. Petrishcheva, N. O. Olenov, B. I. Pomerantsev, N. G. Bregetova, V. B. Dubinin, Z. M. Zhmayeva, F. A. Petunin, Z. P. Korniyenko, A. V. Kochkareva-Bakhayeva, E. B. Kerbabayev and others made a major contribution to the investigation of species composition, distribution, ecology and medical-veterinarian significance of Ixodidae ticks in Turkmenistan.

At the request of the Turkmen Narkomzdrav [People's Commissariat of Health], parasitological expeditions were sent to Turkmenistan from Leningrad (1928, 1930, 1931, 1934), and they were headed by Ye. N. Pavlovskiy and B. S. Vinogradov. Since that time, there has been active investigation of bloodsucking arthropods--carriers of infection--including Ixodidae ticks in this republic. In the prewar period, the participants of parasitological expeditions

and local naturalist-parasitologists conducted faunistic studies of acarids in the Murgab and Atrek River valleys, in the environs of Ashkhabad, Chulya, Firyuza, Repetek, Kara-Kala and some sites in Bol'shoy Balkhan (Ye. N. Pavlovskiy, V. V. Popov, B. V. Lototskiy, Ya. P. Vlasov, P. A. Petrishcheva, V. B. Dubinin, N. G. Bregetova).

More intensive investigation of Ixodes tick fauna of Turkmenistan was deployed in the postwar period. That was also when ecological studies of Ixodidae began. The teaching on natural endemic sites of diseases, which was developed by Ye. N. Pavlovskiy, was instrumental in the study of Ixodidae, their extensive collection and determination of relations to diseases of man and animals. On the one hand, there were intensive studies of tick infestation of farm animals due to the need to organize control and prevention of transmissible zoonoses and zoonanthroposes. A description was provided of the tick fauna, distribution and their quantity on cattle (F. A. Petunin, Z. P. Korniyenko-Koneva, Z. M. Zhmayeva, G. I. Pastukhov and others). In addition to faunistic information, these authors provided some valuable ecological data on the range of hosts, distribution of ticks over different landforms and seasons when they become parasites of cattle (quoted in [2]). The parasitological studies of Ixodes ticks parasitizing farm animals, which were conducted by F. A. Petunin, Z. P. Korniyenko, O. Ch. Charyyev and K. M. Khaydarov, established that there are 12 Ixodidae species involved in piroplasmidosis epizootiology in Turkmenistan.

On the other hand, in connection with development of desert land and construction of the Karakum Canal, studies began of the parasitofauna in endemic sites of transmissible diseases (P. A. Petrishcheva, A. V. Kochkareva-Bakhayeva, E. B. Kerbabayev). Particularly comprehensive studies were conducted in desert areas. Wide distribution of *Hyalomma asiaticum*, one of the dominant Ixodidae species in Turkmenistan, was discovered (A. V. Bakhayeva).

E. B. Kerbabayev discovered nine rare Ixodidae species that had previously been unknown in Turkmenistan; he studied the fauna and ecological distinctions of *H. asiaticum*, *H. detritum*, *H. plumbeum* and *Boophilus calcaratus*. E. B. Kerbabayev studied under laboratory conditions the developmental cycle of some tick species. Most of his studies were concerned with the distribution, range of hosts and number of Ixodidae.

Within a relatively short period of time, extensive studies were conducted in Turkmen SSR, which made it possible to gain an idea about the fauna of Ixodes ticks. Thus, from 1931 to 1972, 38 species and subspecies of Ixodidae were recorded in Turkmenistan, 5 of which were found by N. O. Olenov, 6 by B. I. Pomerantsev, 4 by F. A. Petunin, 4 by V. B. Dubinin and N. G. Bregetova, 4 by A. V. Kochkareva-Bakhayeva, 9 by E. B. Kerbabayev and 1 each by V. V. Popov and B. V. Lototskiy, Ye. N. Pavlovskiy, V. I. Kurchatov, Ya. P. Vlasov, N. A. Filippova and G. I. Pastukhov. Thus, at this time the Ixodidae fauna of Turkmen SSR consists of ticks of the genus *Hyalomma* Koch--12 species and subspecies, *Ixodes Latr.*--10 species, *Rhipicephalus Koch*--7, *Haemaphysalis* Koch--5 species and subspecies, *Dermacentor Koch*--3 species, *Boophilus Sig.*--1. All species of the genus *Hyalomma* found in the USSR are encountered in Turkmenistan.

By now, the Ixodidae fauna of Turkmen SSR has been studied rather fully. However, it is necessary to also make a detailed study of ecological distinctions of different vector species to organize control of these vectors.

In 1965-1980, there was a problem related to investigation of ecology of background Ixodidae species and development of ecological approaches to their control. It was particularly important to find the general patterns of development and parasitism (life schemes), establish the role of *Ixodes* ticks in endemic sites of transmissible diseases, identify the patterns and routes of circulation of pathogens at the endemic sites. The urgency of this problem is increasing because of the development of desert land in Turkmenistan, which is expanding annually. Such studies have been and are being conducted by us [2 and others]. In particular, specially planned observations and experiments covering a broad spectrum of vital functions of *Ixodes* ticks were pursued for several years in the field. We were the first to notice the inconsistency between life schemes of several *Ixodes* species in the arid zone and classical conceptions of two types of parasitism in these ticks: nest-burrow and grazing-"watching" types. In arid regions, deposition of eggs, nutrition and metamorphosis of immature phases of ticks of some species (*Hyalomma asiaticum asiaticum*, *H. plumbeum*, *R. turanicus* and others) occur in the burrows of wild vertebrates, and the hungry imagoes that emerge there crawl out to the surface and attach themselves to grazing animals. The vital functions of another group of ticks (*H. anatolicum*, *H. dromedarii*, *Boophilus calcaratus* and others) are observed chiefly in corrals and stalls. Proceeding from this, we proposed that two more types of Ixodidae parasitism be singled out: pasture-burrow and pasture-stall. These data constitute the scientific basis for investigating circulation of pathogens in endemic and anthropogenic sites of disease, as well as to work out rational means of prevention for the arid zone. Together with virologists and microbiologists (D. K. L'vov, A. A. Pchelkina, Z. M. Zhmayeva, V. L. Gromashevskiy, G. A. Sidorova, L. M. Alkhutova, M. M. Kurbanov, K. N. Stepanova and others), studies were made of circulation of pathogens of a number of arboviral infections and rickettsiosis in Turkmenistan. To date, circulation of pathogens has been found in the endemic sites of diseases in Turkmenistan, and from *Ixodes* ticks pathogens of the following diseases were isolated: Q fever, tickborne typhus, viruses of Crimean hemorrhagic fever, West Nile fever, Vad Medani, Tamdy, Caspian, Baku and Isfagan. The last five were new, and their relevance to human pathology has not yet been studied. The obtained results made it possible to develop and introduce practical recommendations [3, 5]. Virological and parasitological investigations in endemic sites of diseases that are ecologically related to *Ixodes* ticks are continuing.

In Turkmenia, like in all of Central Asia, the method of overall and regular treatment of cattle with toxic chemicals still prevails in the control of ticks. In spite of the intensity of chemical treatment, tick-infested sites still were left as a threat. When using toxic chemicals, sanitary-hygienic measures were often forgotten. Moreover, there were side-effects from these chemicals and, in particular, they penetrated into very valuable foods (meat, milk). For this reason, production and use of certain toxic chemicals in the organochlorine pesticide group was banned. As to other agents, when used for long periods of time, there was habituation to them of bloodsucking arthropods.

One of the main causes of the low efficacy of chemical control was that it was done without knowledge of the ecology of Ixodes ticks, without combining it with domestic and agricultural measures. Yet the ecology of Ixodes ticks in dry regions differs appreciably from that of the temperate zone. In the existing instructions and guidelines for tick control these differences were not taken into consideration. For this reason, there was an acute need to alter the strategy and tactics of protecting cattle from tick invasion. Together with specialists at livestock farms and the veterinary service, we followed the route of integrating protection of cattle against tick attacks, protection with minimal use of toxic chemicals. This work was based on the many years of experience in the study of Ixodes tick ecology in this republic and tactics for controlling them [8].

The "Recommendations for Protection of Cattle Against Ixodes Tick Invasion in Turkmen SSR," which we prepared, have undergone trials in the animal fattening complex in Gyaurskiy and at the farm of the Kolkhoz imeni K. Marx in Geok and Tepinskiy rayons. They were approved by specialists and the scientific and technical council of the TSSR Ministry of Agriculture; they have been published and mailed out for adoption in this republic's agricultural industry. Domestic measures to be performed by the livestock breeders themselves have been given the leading place in protection of cattle against tick invasion. The proposed system for protecting animals against Ixodidae includes domestic-agricultural and chemical methods. It is recommended that the latter method be used selectively and only in cases where it is more effective than others.

When methods are correctly combined, one can protect cattle from tick invasion, lower contamination of the environment by toxic chemicals, recover a good quality of livestock products and save several hundred thousand rubles per year in the republic. For example, the savings from lowering direct costs alone (for agents) at the Gyaurskiy animal-fattening sovkhoz-complex constituted 18,000 rubles per year. A total of 8000 head of cattle are kept at that farm.

Argas ticks are vectors of the pathogens of tickborne typhus in man, Q fever, spirochetosis in chickens. Fowl ticks, which strike poultry farms, are very detrimental to the national economy. Sheep-pen ticks that invade sheep on a mass scale elicit paralysis ("tickborne"). In Turkmenia, Argas ticks have been studied (V. B. Dubinin, N. G. Bregetova, M. V. Pospelova-Shtrom, N. A. Filippova, E. B. Kerbabayev, O. Kh. Shcherbinina, Zh. A. Agapovich, A. V. Bakhayeva) mainly in the faunistic aspect, and 10 species have been recorded.

The first information about Gamasid mites in Turkmenia appeared in the reports of V. B. Dubinin and N. G. Bregetova in 1952. They submitted data about several species referable to three families: Parasitidae, Laelaptidae and Haemogamasidae. A. A. Zemskaya published in 1955 data about 8 Gamasidae species referable to 3 families, which were collected from the great gerbil. T. N. Remyannikova (1955-1962) reported about Gamasid ticks (19 species) from the route of the first section of Karakumy Canal and mountain regions of the republic. A group of acarids that parasitize on birds was described in works by L. L. Semashko, O. Kh. Shcherbinina and O. M. Butenko (1961-1981).

Several of the studies of R. D. Amanniyazova dealt with ectoparasites, including Gamasidae on the great gerbil. In the works of M. A. Meledzhayeva (1956-1980), information is provided about gamasid mites referable to more than 40 species from different parts of the republic [6]. At the present time, according to our data and those in the literature, the list of Gamasidae consists of more than 70 species referable to 11 families (with the exception of the Rhinonyssidae family that inhabits the nose of birds). The Laelaptidae family is the best represented; it includes 27 species, including 5 that are new to science. Of the 11 families mentioned, 5 suck blood. The nonbloodsucking forms either use vertebrates to settle on or else act as predators in animal fur, or they feed on diverse organic residue (dry blood, excrements, skin scales, etc.). Obligatory relationship to different types of shelters, the "burrow" life style, nidicholia, are inherent in the vast majority of parasitic Gamasidae. The types of food are varied. Maximum infestation is observed in the fall-winter and early spring. The increase in number of the nest-burrow parasite, *Hirstionyssus meridianus*, at different stages of development in March and April is related to gerbil reproduction at that time.

The largest number of gamasids (31 species) was found in the great gerbil. *H. meridianus* is typical of the great, red-tailed and midday gerbils.

We were impressed by the discovery on gerbils of mouse, rat and other ticks that have epidemiological and epizootiological significance in newly developed areas close to places where people work and rest (Lake Yashkan, section of canal near the Mary GRES, environs of Ashkhabad).

Gamasids have been found on all examined species of rodents, insectivores, in burrows of different animals and insects inhabiting burrows.

The chiggers of the Trombiculidae and Leeuwenhoekiidae families constitute a distinctive group of organisms characterized by larval parasitism on vertebrate animals.

Chiggers are encountered in different geographic landforms. Their study began relatively recently. Interest in these mites is related to establishment of their epidemiological significance as vectors and pathogens of tsutsugamushi disease. During World War II, mass scale outbreaks of this disease started up in Southeast Asian countries among colonial troops, and this was the cause of intensive investigation of biology, ecology, distribution and medical implications of chiggers. Thus, while only 80 species were known in 1930, up to 500 were identified by 1950. The worldwide chigger fauna numbers over 2000 species, and the number is growing with each year.

Investigation of chiggers began in our country in the late 1940's at the initiative of Academician Ye. N. Pavlovskiy. In 1947, he wrote of the possibility of an endemic site for tsutsugamushi disease in the Far East. That same year, Ye. G. Shluger published the first work dealing with the domestic chigger fauna. In 1955, she compiled the first guide [9] of rodent chiggers in the fauna of the USSR, which included 32 species. For many years, this guide served as a manual for acarologists. N. I. Kudryashova made a large contribution to the study of the chigger fauna of our country. In 1974 [4],

she made a survey of the fauna and systematics of chiggers in the USSR. The survey lists complete information about 147 species referable to the Trombiculinae subfamily, contains a guide to subfamilies of tribes and genera of chiggers known in the USSR. This survey serves as a reference book for specialists. At the present time, there are slightly over 200 species of chiggers in the Soviet Union that have been identified. As noted by N. I. Kudryashova [4], this number "... reflects only an insignificant part of the true situation."

In Central Asia, the most complete information about chigger fauna was obtained in Tadzhikistan, Karakalpakia and Kirghizia. The first information about these mites in Turkmenia was given in 1955 in the guide of Ye. G. Shluger [9], where it is reported that Leeuwenhoekiidae major was discovered in Trans-Unguz Karakumy.

In the period from 1955 to 1965, acarologists registered 25 chigger species in Turkmenistan, 9 of which were found on mammals and reptiles (Ye. G. Shluger et al.) and 16 on burrow-inhabiting birds (Ye. G. Shluger, G. S. Bel'skaya).

In recent years, additional information about chiggers was obtained by the findings of A. Amangulihev (1967-1982) on rodents and reptiles. A total of 26 species new to science were described [1]. Studies were made of some ecological questions: seasonal pattern of population size, distribution in natural regions, localization on host body, etc. Determination was made of some aspects of chigger adaptation to the arid zone of our republic.

At the present time, 63 species of chiggers are observed in Turkmenistan. The above data only give us an idea about the fauna of these mites. Work was done mainly in southern, western and central Kopetdag, as well as Southeast Karakumy. The northern and southeastern regions of the republic have been left virtually unstudied. In these unique zones there is, no doubt, a wide diversity of chigger species.

Thus, many of the questions related to bloodsucking acarids of Turkmenistan have been answered. However, there are many more unsolved problems. Future research should deal with ecology of vectors, parasite-host relations in a three-member parasite system, routes of pathogen circulation in endemic sites of diseases, refinement of steps to control vectors as applied to the arid conditions in Turkmenistan. For this purpose, it is necessary for biological, medical and veterinary acarologists to join forces since, as noted by Ye. N. Pavlovskiy [7], "The 'United Forces' slogan should prevail in all work dealing with control of adverse phenomena in nature, inasmuch as man, the builder of communism on his earth, is the most valuable in a country that is moving with determination toward establishment of a communist society."

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No 1.

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CSO: 1840/1069

PLAQUE EPIZOOTIC IN SARYKAMYSHSKAYA DEPRESSION IN SPRING AND SUMMER OF 1965

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK
in Russian No 1, 1984 (manuscript received 27 Sep 83) pp 31-35

[Article* by I. V. Zhernovov (deceased), Ye. Ye. Punskiy, V. P. Sosnovtseva,
Ye. N. Zagniborodova and O. P. Zhernovova, Turkmen Plague-Control Station]

[Text] There were sporadic findings of plague-infected rodents and local epizootics in the Trans-Unguz part of Karakumy Desert in 1955-1958 [1]. In 1960-1961, a rather diffuse and intensive epizootic occurred in Sarykamyshskaya Desert and in 1962 there was a local epizootic in the western part of Karakumy in the Trans-Unguz region [4]. In 1964, there was also a local plague epizootic among rodents on the Krasnovodsk Plateau and in Southeastern Karakumy [2, 3], and in 1965, on the Trans-Uzboy Plateau and Southern Ust-Urt (Western Turkmenia). That same year, a widespread and intensive epizootic of plague was discovered among rodents in Northern Turkmenia (Sarykamyshskaya Depression).

We were impressed by the simultaneous occurrence of the epizootic over a large territory, in Southern Ust-Urt and the Sarykamyshskaya Depression.

After a profound and lengthy depression of rodent population (1961-1963), which was due to the severe drought, gradual growth in number of rodents and their ectoparasites started in 1963 in North Turkmenia in all landforms. The exceptionally favorable conditions in the spring and early summer of 1964 were instrumental in a drastic growth in rodent population in the fall of the same year. In most areas, great gerbil population size reached 10-12/ha and midday gerbil, 40-80. Population density of the red-tailed Libyan jird reached 40-60/ha in some spots.

The general increase in number of rodents led to virtually overall settling in the Sarykamyshskaya Depression. In some areas their number was higher than in the preceding peak year (1959). The increased density of gerbils led to significant increase in number of their fleas, which was already stabilized in the fall. In the winter-spring period of 1964-1965, weather conditions were unfavorable in northern and, in part, northwestern regions of Turkmenia. The

*Reported to the 6th Conference on Endemicity of Diseases and Problems of Parasitology in Republics of Central Asia and Kazakhstan, 26-31 October 1965.

extended stand of snow, low air temperature, low precipitation (one-seventh of normal) and late vegetation of desert plants worsened the rodents' feed base. By April-May there were already rather distinct signs of drought (the Ferula, which is a good indicator of soil moisture, failed to form flower stalks in virtually all areas), and as a result 1965 was a poor harvest year.

The adverse spring conditions shifted by almost a month the phenological stages in vital functions of rodents (reproduction, migration of young, etc.), lowered the intensity of these processes and led to worsening of the physiological condition of gerbils. By May-June, well-nourished great gerbil specimens constituted only 13%. By the end of the spring there was a decline in rodent population.

This process was manifested to different degrees in different landforms. Thus, in the sand masses, there was a drastic decline in number of midday gerbils by May, and less so for great gerbils. In the Sarykamyshskaya Depression, the decline in number of great gerbils started earlier, in the winter, and it was more marked in the regions of "pukhlyakovyy" [?] and sandy loam plains. In sandbank regions and gulches, the number of great gerbils remained high (up to 10-14/ha) by the end of May, with up to 80% habitability of colonies.

From the fall of 1964 to the spring of 1965, there was no change in number of fleas in great gerbil colonies, and in some areas it rose due to the fleas of midday gerbils (*Xenopsylla conformis*), since in this period the population of midday gerbils and red-tailed jirds was very large, and it began to decline only toward the end of the spring.

Against the background of worsened living conditions (drought) and start of decrease in number of rodents, the weight of which was low, a plague epizootic was found in the Sarykamyshskaya Depression in late May.

The first cultures of *Yersinia pestis* were obtained on 21 May from rodents and ectoparasites collected on 18-19 May in the region of the Kanga-Kyr elevation (elevation 62). The epizootic was discovered in areas with a large great gerbil population, where the most favorable living conditions had remained. From 18 May to 18 June 1965, 117 strains of *Y. pestis* were isolated (79 from great gerbils, 2 from midday gerbils, 2 from red-tailed jirds, 1 from the large-toothed suslik [ground squirrel], 32 from fleas and 1 from ticks). In all, about 8000 mammals (of which 95% were gerbils) and 68,000 fleas were submitted to bacteriological examination. A total of 14 epizootic "points" were found. The epizootic occurred on an area of about 170,000 ha.

In addition to great gerbils, the epizootic involved the red-tailed jird and midday gerbils, infection of which constituted 5.2 and 3.1%, respectively. Among the fleas, most were referable to species of the genus *Xenopsylla*: *X. gerbilli caspica*, *X. hirtipes* and *X. conformis*. In all likelihood, the epizootic had been discovered at the very start of its development. This is indicated by the following facts: the rodents were acutely sick and *Y. pestis* was isolated from all organs and blood; there were virtually no pathoanatomical changes in the rodents; virulence of isolated strains was high (biotested animals died rapidly, on the 2d-4th day; animals that had died of the plague were found in the fields). In places where the plague epizootic was found, the great

gerbil colonies were well-inhabited; there were no recently abandoned colonies or mass scale migration of adult fleas. Bacteriological examination of this territory, which was done in April, yielded negative results.

We singled out three sections in the epizootic territory, which differed in physical conditions and course of epizootic (Table 1).

Central or transitional section--this is where the first cultures of *Y. pestis* were isolated. The second consists of a sandbank that changes to the south into a takyr-like [clay-surfaced desert] plain. Great gerbil infection with *Y. pestis* constituted 4.5%. Positive flea cultures (from fur and burrows) constituted 12.9%.

The epizootic was acute here. One-third of the great gerbils presented bacteremia. In addition to great gerbils, *Y. pestis* cultures were isolated from red-tailed jirds and midday gerbils.

The southern section consists of a system of loamy gulches, which begin near the Kanga-Kyr well and go to the Yedykhauz takyr. *Y. pestis* cultures were isolated here from great and midday gerbils, red-tailed jirds and large-toothed susliks. Two rodents (great gerbil and red-tailed jird) were found that died of plague. The epizootic was less acute, as indicated by the lower figures for *Y. pestis* infection of the rodents and fleas (3.0 and 0.2%, respectively), and colony involvement constituted 6%. Bacteremia was demonstrated in 5 out of 20 plague-stricken gerbils.

In this section, we recorded the most intensive migration of adult fleas. Infected fleas were found--*X. g. caspica* and *X. conformis*.

The northern section is a sandbank, which is a continuation of the central section in a northeasterly direction, which then changes into several sandbanks of the Chukurlyk and Kulantlyk areas. It was inspected after the southern section. In this section, particularly its northern part, the epizootic was more acute. We observed here the highest rate of infection of great gerbils (7.2%) and colonies (14.7). Bacteremia was observed in great gerbils in 40% of the cases. We found one great gerbil that had died of the plague. Cultures were isolated mainly from great gerbils and, in one case, from a midday gerbil. In spite of the bacteremia present in infected great gerbils, the percentage of positive cultures from fleas was low (3.2), and fleas infected by *Y. pestis* were found in the northern part of this region. There was minimal migration of fleas, and it was referable to young specimens. The same flea species as in the southern section were found to be infected. The freshness of the epizootic process in this region was indicated by the ease of cultivation and profuse growth of *Y. pestis* from the rodents.

Table 1. Data on infection of great gerbils, presence of bacteremia and isolation of cultures from fleas

Place where material was collected	Central section				Southern section				Northern section				Mean for section
	Gerbils breakdown	Fur	Fleas burrow	% infected	Gerbils had bacter- emia	number of cul- tures	posi- tive	number of cul- tures	great gerbil with bacter- emia*	fleas (accord- ing to cultures)	gerbils	great gerbil with bacter- emia*)	
total exam- ined													
West Kanga-Kyr, 4-5 km north of elevation 62	381	17	7(3)**	66	12	50	3	4.5	12.9	1.8			
10 km south of elevation 62	123	3	0	55	0	27	0						
Eastern Yedykhauz	8	2	2(2)	4	1	0							
Elevation 65	17	1	0	15	0	12	0						
Elevation 61***	87	0	0	53	0	6	0						
Kanga-Kyr well	51	1	1	51	0	12	0						
4-9 km south of Kanga-Kyr	49	1	1(1)	46	0	21	0						
West Shorly	96	4	1	78	0	19	0						
10 km north of elevation 62	187	9	2(1)	98	0	1	0						
" "	91	9	2(1)	32	0	0							
5 km north of elevation 60	73	6	2(1)	13	0	5	0						
12 km "	105	2	1	12	0	6	0						
North Kulanlyk	113	12	3(1)	137	5	2	1						
North Chukurlyk	119	12	10(3)	105	4	30	4						

*Percentage of great gerbils with bacteremia was calculated in relation to total number of great gerbils examined.

**Profuse growth of *Y. pestis* from blood.

***Two cultures from fur fleas (*X. g. caspica* and *X. conformis*) were obtained from a dead red-tailed jird.

In spite of the fact that there were some differences in nature of epizootic in the sections studied, on the whole it was acute, and the epizootic sections were ecologically interrelated. The settlements of great gerbils on the sand-banks and in loamy gulches are indigenous (constant) and they have the best conditions for the rodents in the landforms of "pukhlyakovyye," loamy and clay plains of the Sarykamyshskaya Depression. Analysis of the obtained data leads us to assume that the epizootic was manifested earlier in the south than in the north. Young and adult great gerbil specimens participated to equal extents in this epizootic. Thus, 28 out of 56 plague-infected animals were adults (14 males and 14 females) and 28 were young (19 males and 9 females). The *Y. pestis* strains presented mostly the typical morphology of colonies. In some cases, the colonies were attacked by phage (Twort phenomenon). In all cases, the test with plague bacteriophage was positive. All of the cultures of *Y. pestis* isolated from fleas belonged to the fall population that had survived a winter. The spring population of fleas had apparently not yet had time to become involved in the epizootic process. It must be noted that cultures of *Y. pestis* were obtained during the epizootic from fleas collected from healthy gerbils. Two species of fleas were found to be the vectors of *Y. pestis*--*X. g. caspica* and *X. conformis*. *X. conformis* fleas were infected the most, and their number was relatively high. The percentage of positive cultures constituted 0.4-3.2 for *X. g. caspica* fleas and 3.1-4.0 for *X. conformis*.

In July, the epizootic continued in the same areas and with the same intensity. Infestation rate of great gerbils in the territory as a whole constituted 4.3% and for colonies, 10%. *X. g. caspica* fleas of the spring population were found to be infected, and the percentage of positive cultures from them reached 2.5. Repeated testing of marked great gerbil colonies yielded only 5% *Y. pestis* cultures from the same colony on two occasions (in June and July). Unlike May (when the epizootic began), in July the *Y. pestis* cultures were never isolated at the same time from rodents and fleas taken from the animals or collected in their burrows.

The plague epizootic during the entire summer was noted in northern Turkmenia for the first time. Interestingly, it occurred in areas recently rid of the waters of Sarykamyshskoye Lake; formation of the sandy topography is not yet completed there, and for this reason ecological conditions are unstable.

The observed epizootic confirms once more the enzooticity of the Sarykamyshskaya Depression. It can be assumed that the system of gulches and sandbanks in the plains where there are indigenous (permanent) settlements of great gerbils are sections that retain plague infection for a long time (microfoci).

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BRUCELLOSIS THREAT IN KAZAKHSTAN

[Editorial Report] Alma-Ata KOMMUNIZM TUGHI in Uighur 17 April 1984 page 4 carries a 600-word article by S. Amireyev, candidate of medical sciences, on the dangers of brucellosis, for both man and livestock. Spring is a time when many livestock diseases flourish, and one of the most dangerous such diseases is brucellosis. It can spread widely among sheep, goats, and cows, and for man the most dangerous type is sheep and goat brucellosis. If during the lambing season a lamb is born dead, some herdsmen do not bury it in a designated place, but toss it into a hole or leave in an open place for dogs and birds to eat, in which case the brucellosis microbes can spread quickly and can infect many wild animals. The danger of brucellosis afflicting people is especially great on farms that raise Karakul sheep, because of exposure to the pelts and the opportunity to eat infected meat. Amireyev stresses that even extremely healthy people can become sick if exposed to the microbes. Often people come to the farms to help out in the lambing season, and because of improper clothing protection and failure to submit to disinfection, these people sometimes contract brucellosis. The best way to prevent the disease is to identify infected animals and destroy them in time, something especially important for livestock in private possession. Amireyev warns about children contracting the disease, since children almost cannot fight against brucellosis microbes. It is beyond dispute that, if even one animal among a large number becomes infected with brucellosis and if measures are not taken against it in time, the consequences will be severe. An afflicted person should be immediately treated by a physician.

DYSENTERY PROPHYLAXIS IN UZBEKISTAN

[Editorial Report] Tashkent LENIN BAYRAGHY in Crimean Tatar 28 April 1984 page 4 carries a 700-word article by T. Islyamova, candidate of medical sciences, on dysentery, which like some other intestinal diseases becomes more prevalent in hot weather. The microbes responsible for dysentery can multiply rapidly in hot weather and can be found on food products, especially fruits and vegetables. It is possible for the infection to be passed on by means of objects used by an afflicted person and to be spread in houses where sanitary conditions are poor or in kindergartens and nursery schools in which the sanitary regimen has been disregarded. During the summer, flies can spread dysentery widely. Islyamova then describes the symptoms of the illness and notes that in its acute form the intoxication can be severe. She advises readers to seek immediate medical help at the onset of symptoms, since, if treated incorrectly, the illness may become chronic and the afflicted person may not recover fully from it for several years. Dysentery is especially dangerous for children and the elderly. Most people who contract the disease are treated under hospital conditions, with only a few being cared for at home. Islyamova lists 8 medicines used to treat those with dysentery and describes the recommended diets. To protect oneself from intestinal diseases, one should wash fruits and vegetables well in spring water or used boiled water, before eating them.

UDC 599.32:619;616.9-036.2

PROGNOSTICATION FUNDAMENTALS FOR RODENT EPIZOOTIC OUTBREAKS IN ENDEMIC
PLAQUE AREAS

Moscow ZHURNAL OБSHCHEY BIOLOGII in Russian Vol 45, No 4, Jul-Aug 84
(manuscript received 19 Sep 83) pp 485-490

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[Abstract] Soviet literature is surveyed on the fundamental aspects of prognosticating the population density of rodents and their ectoparasites in relation to the incidence of plague epizootics. The trial-and-error method, which was largely utilized in the earlier studies on plague epidemiology, has been found to be an effective and reliable approach which has much to offer in the way of simplicity. However, the method is tedious and failure to accurately estimate certain parameters of variables will lead to prognostic errors. More recently, emphasis has been placed on the use of multiple regression equations to devise models providing predictive values as to rodent and ectoparasite population densities. Difficulties have been encountered in such an approach in securing the high degrees of correlation between the variable of interest and environmental factors and, consequently, entirely satisfactory equations for predicting epizootic episodes have not been devised as yet. Finally, yet another approach is to use probability tables for alternative prognostication. The technique results in the creation of a statistical system which yields a quantitative prediction of the most important changes in the epizootic situation, and yet does not require computer time. References 18 Russian.

[1589-12172]

SPORE-FORMING AEROBIC BACTERIA AS ETIOLOGICAL FACTOR OF BACTERIEMIAS

Prague ZHURNAL GIGIYENY EPIDEMIOLOGII MIKROBIOLOGII I IMMUNOLOGII in Russian
Vol 28, No 2, 1984 (manuscript received 24 Jan 83) pp 205-212

SMIRNOV, V. V., SOROKULOVA, I. B. and REZNIK, S. R., Institute of Microbiology
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[Abstract] Analysis of data in the literature of the field and of experimental findings indicated that spore-forming aerobic bacteria may cause various diseases in man and confirmed the fact that special attention must be paid to cases involving isolation of such bacteria from the blood. Special attention was given to diseases caused by the *Bacillus* genus. Study of problems concerning pathogenicity of spore-forming bacteria must include a thorough study of the virulence of isolated cultures after various methods of administration since virulence occurs only after introduction of the bacteria involves certain pathways. The importance of species identification of bacillae isolated from the blood and thorough study of the pathogenicity of these bacteria were emphasized. References 47: 12 Russian, 35 Western.

[1582-2791]

GENETICS

UDC 576.1:576.312.342.576.858.9

PHAGE-MUTATION MEDIATED INTRODUCTION OF HYBRID PLASMID RP4::D3112 INTO
PSEUDOMONAS PUTIDA

Moscow GENETIKA in Russian Vol 20, No 6, Jun 84
(manuscript received 18 Oct 83) pp 907-914

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[Abstract] The genome of the transposable phage D3112w⁺ (w⁺ = wild type), which is specific for *Pseudomonas aeruginosa*, cannot be introduced into *P. putida* via the hybrid plasmid RP4::D3112. However, D3112 phages with lpc (lethal for *P. putida* and *E. coli*) mutations can be used for transformation of *P. putida* as part of the hybrid plasmid RP4::D3112lpc. It appearssthat expression of the lpc⁺ allele does not depend on the bacterial chromosome or that of the plasmid vehicle, since clones containing the RP4::D3112lpc show no evidence of a bacterial mutation stimulating repeat insertion of RP4::D3112w⁺ or of RP4::D3112lpc into the cells. The use of other plasmids, e.g., RPL11, is also without effect on the entry process. Analysis of heteroduplexes formed between the DNA molecules of D3112w⁺ and D3112lps did not reveal regions of nonhomology, indicating that lpc represents a point mutation. The use of hybrid plasmids (RP4::D3112) carrying a deletion in the phage genome and the lpc2 mutation made it possible to localize the latter in the 20-29.9 kb region. Figures 1; references 13: 7 Russian, 6 Western.
[1576-12172]

UDC 575.1:582.282

RECOMBINATION OF EPISOMAL AND INTEGRATING PLASMIDS IN SACCHAROMYCETE
COTRANSFORMATION

Moscow GENETIKA in Russian Vol 20, No 6, Jun 84 (manuscript received 21 Nov 83)
pp 915-923

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[Abstract] Cotransformation of *Saccharomyces cerevisiae* with episomes (pYF91 and pYE ADE2-2) and integrative plasmids incapable of autonomous replication in yeast cells (YIp1 and YIp29), carrying homologous bacterial genes, was used to study the phenomenon of plasmid recombination. Individually, the plasmids were characterized by marked differences in the efficiency of transformation (10^{-3} to 10^4 per regenerated protoplast for pYF91 and pYE ADE2-2, 10^{-8} for YIp1 and YIp29). However, cotransformation with both types and selection for episomal traits showed a marked increase in the frequency of integrative plasmid markers, with the frequency of cotransformation approaching 40%. The double transformants demonstrated a simultaneous loss of both plasmid markers with a frequency characteristic of the episomes. Transformation of *E. coli* cells with plasmid DNA isolated from cotransformed yeast cells yielded bacterial cells with stable retention of either or both plasmid markers. Subsequent digestion of the plasmid DNA molecules with restriction endonucleases and electrophoretic analysis of the fragments confirmed the recombinant nature of the plasmids. Consequently, cotransformation with episomal and integrative plasmids that are partially homologous, and subsequent selection of chimeric plasmids on the basis of antibiotic susceptibility, represents a convenient method for securing recombinant plasmids.

Figures 2; references 23: 7 Russian, 16 Western.

[1576-12172]

UDC 575.24:576.856.9

MUTAGENIC EFFECTS OF ALKYLATING AGENTS ON PROPHAGE λ

Moscow GENETIKA in Russian Vol 20, No 6, Jun 84
(manuscript received 15 Jun 83) pp 933-942

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[Abstract] An evaluation was made of the relative contribution of repair and reparative mechanisms to the mutagenic potency of several alkylating agents on thermoinducible prophage λ cI857 ind^- in several strains of *E. coli*.

Following treatment of lysogenic E. coli with the mutagens and heat induction, 0.02 N-nitroso-N-methylurea (NMU) induced c mutations with a high frequency (ca. 10%) in both wild type E. coli and cells with repair mutations (recA13, lexA102, uvrA6, umuC36, xthA9, recF143, polA1, uvrD3, uvrD502). It appears that NMU-induced mutations are stabilized as replicative errors due to mismatched, altered bases. Delay in induction following exposure to NMU improves prophage survival and diminishes c mutant formation, regardless of the E. coli genotype. Evidently, carbamoylation is not involved in NMU mutagenicity since 0.02 M KNCO is nonmutagenic and is virtually without effect on prophage viability. Replicative mechanisms are also involved in N-methyl-N'-nitro-N-nitrosoguanidien (15%) and ethyl methanesulfonate (2%) induced mutations, since the maximum yield of mutants was independent of recA⁺ genotype. However, the mutagenicity of methyl methanesulfonate was abolished by the recA mutation, indicating that the mutagenicity of this agent is repair-dependent. Mitomycin C (0.1%) and acridine mustard (0.3%) induce c mutations regardless of recA⁺ and, therefore, appear to do so by intercalation. Figures 6; references 26: 3 Russian, 23 Western.
[1576-12172]

UDC 575.1:576.851.5

CLONING LOCUS purA16 IN BACILLUS SUBTILIS REC⁺

Moscow GENETIKA in Russian Vol 20, No 6, Jun 84
(manuscript received 4 Apr 83; in final form 26 Jul 83) pp 943-948

POLUEKTOVA, Ye. U. M., LAKOMOVA, N. M., BELOVA, T. S. and PROZOROV, A. A., Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow

[Abstract] Employing standard techniques of DNA recombinant technology, a study was designed to determine whether it is possible to clone a homologous segment of chromosomal DNA from Bacillus subtilis in B. subtilis Rec⁺. Using as a vector plasmid pBD12 (chloramphenicol and kanamycin resistance), a hybrid plasmid was constructed carrying purA16 locus of B. subtilis. The hybrid plasmids were maintained in transformed cells grown on media supplemented with the antibiotics, but were lost when the antibiotics were eliminated from the culture medium. DNA analysis showed that the cloned DNA fragment was inserted into the host bacterial chromosome with a frequency of 10⁻² per cell per generation. In addition, one clone was identified in which the plasmid genes for chloramphenicol and kanamycin resistance were inserted into the B. subtilis chromosome. Figures 2; references 13: 5 Russian, 8 Western.

[1576-12172]

EFFECTS OF INDUCED CHROMOSOMAL REARRANGEMENTS ON FERTILITY AND VIABILITY
OF ANOPHELES ATROPARVUS

Moscow GENETIKA in Russian Vol 20, No 6, Jun 84
(manuscript received 28 Jan 83; in final form 12 Oct 83) pp 968-973

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[Abstract] Mating studies were conducted on three lines of Anopheles atroparvus mosquitoes with the following induced chromosomal rearrangements: In2(R;L)1+In2L1, In3(R;L)1+D3R1, and T3(2R;3R)1. The fertility of such specimens was found to be reduced 2.5 to five-fold in comparison with control mosquitoes, and no homozygotic mosquitoes were detected. The observed partial sterility of mosquitoes heterozygotic for chromosomal rearrangements was ascribed to various meiotic events which lead to the production of aneuploid gametes. Following fertilization, they form nonviable zygotes.

References 16: 5 Russian, 11 Western.

[1576-12172]

HUMAN FACTORS

PSYCHOLOGICAL PROBLEMS OF ACCELERATING DEVELOPMENT AND INTRODUCTION OF INTEGRATED SYSTEMS OF CONTROL OF FLEXIBLE AUTOMATIC PROCEDURES (ISU GAP)

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 3, May-Jun 84, pp 75-79

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USSR Council of Ministers

[Abstract] Consideration of the human factor and personal problems experienced by personnel were said to be more important than strict emphasis on problems of development, operation and management during accelerated development and introduction of integrated systems of control of flexible automatic procedures. Dysfunctional behavior as a reaction to disregard of workers' needs in this process may arise from lack of hope for the future, from fear that one change will lead to many others or from loss of former independence. Technical personnel, including systems analysts, are less likely to be threatened by the changes but conflicts between them and the user may arise. Doubt in the efficiency of an ISU GAP [integrated systems of control of flexible automated plants] may arise from unrealistic expectations concerning the ISU GAP, past shortcomings in the performance of electronic computer systems, lack of mutual understanding between the systems analyst and the user and use of jargon by the systems analyst which is not understood by the user. Such negative attitudes may be counteracted by presenting stable procedures to meet the needs of personnel, by alleviating fear of changes that may affect personnel, by training workers to function in the new system and by familiarizing all persons involved with the purpose and characteristics of the ISU GAP.

[745-2791]

PSYCHOLOGICAL BARRIER DURING DESIGN OF AUTOMATIC CONTROL SYSTEMS SECOND WAVE

Moscow PSYCHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 3, May-Jun 84 pp 69-75

GRZHIBOVSKIY, S. P., CANDIDATE OF TECHNICAL SCIENCES, DOCENT, STUDENT AT THE
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[Abstract] Experience in development and introduction of sector automatic control systems at the USSR Goskomsel'khoztekhnika has shown that the well-known psychological barrier arising during initial establishment of automatic control systems is followed by a second psychological barrier, arising in the period of stable industrial operation of the system and impeding progress in management automation procedures. The second wave occurs after 3-5 years of stable operation of a system and includes doubts about the efficiency of the system, attempts to speed-up the system and attempts to convince higher management that the system is reliable. The second psychological barrier is caused by relative reduction of effectiveness of capital and current investments used to maintain and continue development of the system, the need to make decisions which increase responsibility of personnel for results of operation, increasing the danger of personnel losing their importance and prestige in the production process and reduction of the number of managerial personnel. This barrier may be overcome by reducing operation costs, providing supervisors of data and information systems free access to operational information and transferring the most troubled associates to new duties.

[745-2791]

IMMUNOLOGY

NEW TECHNOLOGY IN ANTIBIOTICS PRODUCTION

Moscow MEDITSINSKAYA GAZETA in Russian 22 Aug 84 p 3

[Excerpts from article by S. Navashin, director of All-Union Scientific Research Institute of Antibiotics, and academician, USSR Academy of Medical Sciences: "Clinical Pharmacology: A New Era of Antibiotics"]

[Excerpts] The coming of the era of antibiotics is due to the discovery of penicillin. Then appeared streptomycin, tetracycline, erythromycin... They were created on the basis of natural molecules or their simplest modifications: bicillin, phenoxyethylpenicillin and tetracycline derivatives and macrolides were created in this manner.

Many years of experience in the use of traditional antibiotics has pointed up their shortcomings as well as their astonishing therapeutic properties. Therefore, the problem of creating new compounds has become extraordinarily acute, particularly under conditions where there is broad distribution of resistant forms of such pathogens as staphylococci and certain gram-negative microorganism. Several of them have polyresistance at the same time to a number of antibiotics, causing the development of serious difficulties in treatment.

New Technologies. One more-practical possibility for synthesizing new antibiotics remains--with the help of genetic engineering methods. Boundless possibilities are being discovered in this field, after overcoming several procedural difficulties.

The synthesis of new antibiotics in the world has been chiefly due to successes of the basic sciences--microorganism genetics, experimental chemotherapy, bio-organic chemistry--in a directed search, study and putting into practice of new generations of antibiotics. This turn of events then led to the creation of new realms of technology--biocatalysis, synthesis of complex intermediate products for obtaining nuclei and side chains of new compounds. Thus the tasks of biotechnology and organic synthesis drew together significantly.

A base has been created in our country for the major production of semi-synthetic penicillins, the output of which has increased by a factor of more than three in recent years, and other very important transformed antibiotics. The scale of scientific research, and especially of the production base,

however, is still not meeting public health demands. Existing problems of providing many types of raw materials, intermediate products and special equipment and materials, the creation of drug forms, profiling plants for the production of intermediate products and prepared drug forms, of expanding the scientific and experimental base--all these problems must be solved for the broad implementation of semisynthetic antibiotics into practice. This will make it possible to substantially improve results in the control of infectious and suppurative-inflammatory diseases.

12262
CSO: 1840/1621

UDC 612.017.1:612.6.05/.014.46:615.371:579.843.1

GENETIC DETERMINABILITY OF IMMUNITY TO ORAL CHOLERA VACCINE ANTIGENS

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 84
(manuscript received 5 Jan 82) pp 63-66

NAZAROVA, L. S., ISUPOV, I. V., PAVLOVA, L. P., GOR'KOVA, A. V.,
DUSHKIN, V. A., DZHAPARIDZE, M. N. and ZAYTSEV, T. I., All-Union Scientific
Research "Mikrob" Plague Control Institute, Saratov; Scientific Research
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Sciences, Moscow

[Abstract] This report deals with study of the protective action of each of the several immunogenes potentially present in a constructed vaccine, the synergism or antagonism of those genes, and establishment of the immunological response of the immunogene vaccine; the latter will help to select optimal dose and to plan desirable components in the vaccine. The study concerned an oral cholera chemical vaccine. The desirable animal subject as model for testing immunogenicity of the oral vaccine was found to be inbred strains of mice CruB1/6 Sto (H-2^b), C BA/Lac Sto and AKR/Y (H-2^k)--as opposed to mongrel mice--since the inbred mice possess a genetic determinability of immunity to cholera vibrio antigens. Each of the inbred lines is appropriate for selection of the desired vaccine components. However, in selecting the optimum composition of the oral chemical vaccine, it is important to test the immunogenicity of the specific sample because the mouse lines differ in sensitivity and immunological reactivity to vaccine components. Figures 2; references 12: 6 Russian, 6 Western.

[1532-8586]

UDC 612.112.95.014.46:615.371:579.881.11

MACROPHAGE MIGRATION INHIBITION REACTION IN GUINEA PIGS VACCINATED WITH
CHEMICAL EXANTHEMATOUS TYPHUS VACCINE

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 84
(manuscript received 1 Nov 82) pp 66-69

CHERESKOVA, Ye. A., KEKCHEYEVA, N. G., VOVK, O. A., MOROZOVA, V. Yu. and
BELOUSOVA, L. S., Institute of Epidemiology and Microbiology
imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow

[Abstract] Two vaccines are available in the USSR for vaccination against epidemic typhus: a live, combined exanthematous typhus vaccine E and a chemical exanthematous typhus vaccine. The latter, felt to be more promising, is assayed in animals by complement fixation reaction, indirect hemagglutination and by reaction of neutralization of toxic substances of *R. prowazekii*. The present work studied the cellular factors involved in immunological response (in guinea pigs) to the chemical vaccine, particularly the slow type of hypersensitivity (GTZ) developed in guinea pigs vaccinated with the chemical vaccine. The GTZ is measured in the macrophage migration inhibition reaction (RIMM). The RIMM course and intensity were found to be a function of the delivered dose of vaccine: a 32 Au dose produced maximum effect in one week, but this disappeared in the fourth week, while a 64 Au dose was maximum in the second week and persisted to the sixth week. The RIMM indices after the vaccination of guinea pigs are similar to those produced after experimental epidemic typhus infection. Figures 3; references 6:
4 Russian, 2 Western.

[1532-8586]

UDC 615.371:579.843.1/.015.46:612.017.1

PRODUCTION OF AGGLUTININS AS FUNCTION OF METHOD OF ADMINISTRATION OF
CHOLERA ANTIGENS AND IMMUNIZATION PROCEDURE

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 84 p 94

TYUMENTSEV, S. N., ANDREYEVSKAYA, N. M., KAZARENKO, T. D., BEZNOSOV, M. V.
and SELEZNEVA, Ye. Yu.

[Abstract] The title article is reported to have been deposited, 16 Nov 82, as No 5643-82, in VINITI [All-Union Institute of Scientific and Technical Information]. The efficacy of immunization of rabbits by soluble and corpuscular cholera antigens by various methods of administration was determined. The soluble and corpuscular cholera antigens possess different antigenic activity depending on site of administration, e.g., intravenous or intra-lymphatic. Qualities of the vaccinated-rabbit blood are described.
[1532-8586]

MARINE MAMMALS

UDC 612.821.7+599.745.3

SLEEP PATTERNS IN CASPIAN SEALS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 34, No 2,
Mar-Apr 84 (manuscript received 26 Aug 83) pp 259-264

MUKHAMETOV, L. M., SUPIN, A. Ya. and POLYAKOVA, I. G., Institute of
Animal Evolutionary Morphology and Ecology imeni A. N. Severtsov,
USSR Academy of Sciences, Moscow

[Abstract] Electrophysiologic studies were conducted on the sleep patterns of four adult Caspian seals (*Phoca caspica*), in order to provide better understanding of this physiological parameter in the cetaceans. Observations on the animals for a period of several months demonstrated that the animals remain awake $85.5 \pm 1.5\%$ of the time during a 24 day; slow-wave sleep accounts for $12.8 \pm 1.4\%$ of the time, and paradoxical sleep accounts for $1.7 \pm 0.2\%$ of the time. In distinction to dolphins, the Caspian seals do not have a unihemispheric slow-wave pattern, but present with a distinct pattern of paradoxical sleep. These differences may be due to the fact that the seals remain immobile during sleep while the dolphins are in constant motion (even when asleep). Somewhat more time is spent asleep when the animals are on land and, when a change of position is not required for breathing, the seals breathe without awakening in analogy to terrestrial mammals. However, when emergence or change of posture is required to elevate the nostril above the water level, a brief period of awakening is required. Figures 3; references 6: 4 Russian, 2 Western.
[791-12172]

UDC 577.159

SPERM WHALE LUTEINIZING HORMONE: AMINO ACID SEQUENCE OF REDUCED,
CARBOXYMETHYLATED β -SUBUNIT

Moscow BIOKHIMIYA in Russian Vol 49, No 6, Jun 84
(manuscript received 27 Sep 83) pp 1004-1018

PANKOV, Yu. A. and KARASEV, V. S., Institute of Experimental Endocrinology
and Hormone Chemistry, USSR Academy of Medical Sciences, Moscow

[Abstract] Standard techniques of peptide chemistry were used in the analysis of the amino acid sequence of the β -subunit of sperm whale (*Physeter catodon*) luteinizing hormone. The β -subunit was determined to consist of 118 amino acids, with the N and C termini consisting of, respectively, proline and leucine. The carbohydrate moiety was located on Asn¹³. The analytic data are summarized in tabular form and compared with the β -subunits of other species. The data for the sperm whale β -subunit provide additional confirmation that interspecies differences in the luteinizing hormone are due largely to this subunit. Figures 6; references 14: 3 Russian, 11 Western.
[1571-12172]

UDC 621.82+612.821.7+599.745.1

SLEEP AND WAKEFULNESS PATTERNS IN NORTHERN FUR SEAL

Moscow ZHURNAL VYSSHEY NERVOY DEYATEL'NOSTI in Russian Vol 34, No 3,
May-Jun 84 (manuscript received 21 Jul 83) pp 465-471

MUKHAMETOV, L. M., LYAMIN, O. I. and POLYAKOVA, I. G., Institute of Animal Evolutionary Morphology and Ecology imeni A. N. Severtsov, USSR Academy of Sciences, Moscow

[Abstract] Sleep and wakefulness patterns in the Northern fur seal (*Callorhinus ursinus*) were evaluated for comparison with analogous parameters reported for other pinniped species. Electrophysiologic (EcoG, neck electromyograms, electrooculograms, EKG) studies on three 2.5-3.5 year old males showed that within a circadian time-frame active wakefulness accounts for $3.20 \pm 5.3\%$ of the time, inactive wakefulness for $31.7 \pm 3.1\%$, slow-wave sleep for $30.5 \pm 5.1\%$, and REM sleep for $5.8 \pm 0.9\%$. In the sleep phase, the mean duration of a sleep cycle was 22.6 ± 1.2 min. In addition, all animals exhibited pronounced interhemispheric slow-wave asymmetry on the EcoG readings, which occupied approximately $15.0 \pm 0.7\%$ of the circadian timeframe (i.e., ca. 50% of the slow-wave sleep time). The neurophysiologic basis for such asymmetry remains unknown; it has also been noted in the dolphin, but not in the Caspian seal. Figures 3; references 7: 3 Russian, 4 Western.

[783-12172]

MEDICINE

UDC 615.471:616-073.756.8:681.31

SOME PERFORMANCE DATA OF SOVIET COMPUTER TOMOGRAPH SRT-1000M

Moscow VESTNIK RENTGENOLOGII I RADIOLOGII in Russian No 3, May-Jun 84 pp 74-76

[Article "Some Performance Data of the Soviet Computer Tomograph SRT-1000M", by V. M. Zhivoderov, A. V. Shelepin, N. T. Adamov, E. D. Kleshchenko, S. G. Andrianov and M. N. Golutvina, Fourth Main Administration, RSFSR Ministry of Health, Moscow]

[Text] The topographic-anatomic structure of the skull makes it difficult to more precisely distinguish many pathological processes of the brain. This is caused by the fact that the majority of anatomic features of the brain do not find reflection in standard craniograms. For this reason, many diagnostic problems are solved with the wide usage of invasive methods of X-ray analysis (angiograph, pneumoencephalograph, ventriculograph and others), during the use of which, in many cases, complications occur. According to data of Soviet and foreign authors [1-4], computer tomography has not only broadened diagnostic and differential-diagnostic possibilities, but has also made it possible to reduce the amount of invasive analysis methods. But this method is still not widely employed in medical practice.

Soviet industry has developed and started production of the computer X-ray tomograph SRT-1000M for examination of the brain. The first model of this series is installed in the Central Clinical Hospital. During the time of its use from April 1983, data have been accumulated which touch upon several technical characteristics of the tomograph and clinical observations. Since in the near future many medical institutions of this nation will be equipped with these devices, we consider it possible to share our preliminary impressions and results.

Basic characteristics which determine the quality of the tomograph are the spatial resolution and density resolution. At the allowed dose for one scanning--0.04 Gr--the theoretical density resolution of the SRT-1000M must be 0.6%. In practice, the tomograph's resolution is a bit worse. Results of measuring the spatial distribution of the image density of the phantom being set with the tomograph show that the actual resolution of the tomograph can be considered close to 0.8%.

A reason for this, apparently, is the asymmetry of the phantom exposure, which is not being completely removed by the reconstruction program, since in the tomograph SRT-1000M, scanning is done from one temporal area to the other at 180° (through the occipital area). One may assume that the influence of asymmetry will be the most substantial basically in the front and back area, since the temporal areas in the majority of cases are sufficiently far from the border of the reconstruction area, and therefore the influence of this factor will be less here. Thus, reserves exist for increase of resolution, because of improvement in the image reconstruction program.

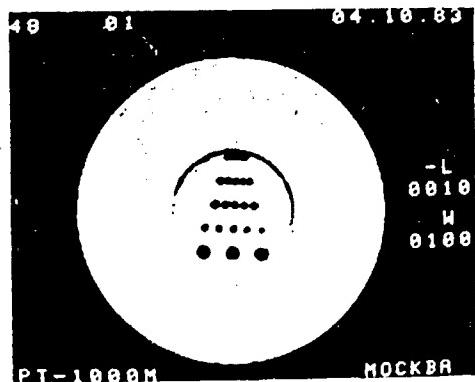


Fig. 1. Image of the test-phantom.

Spatial resolution of the tomograph was evaluated by the image of standard phantoms with calibrated openings. The minimum diameter of various openings was 0.8 mm (fig. 1).

A preliminary clinical evaluation of diagnostic and differential-diagnostic possibilities, still based on a small number of observations, attests to the sufficiently broad possibilities of the SRT-1000M. The study of X-ray-anatomic structures makes it possible to differentiate between the cortex and the white matter of the brain, the subcortical nuclei and the internal capsule and the CSF system. Possibilities of their clear differentiation give the opportunity not only to correctly recognize the pathological process, but also to specify its localization, extension and interrelation with structures surrounding the focus. These are initial data for the clinical physician and especially for the neurosurgeon when choosing the most efficient method of treatment. Our observations show that, with the aid of the SRT-1000M, it has still not been possible to receive a clear image of a pathological focus with a diameter of less than 0.5-0.7 cm, which is caused by the factors indicated above. To illustrate this, we could cite examinations of patient B., 51 years of age, referred in connection with acute damage to cerebral circulation of the ischemic type (fig. 2).

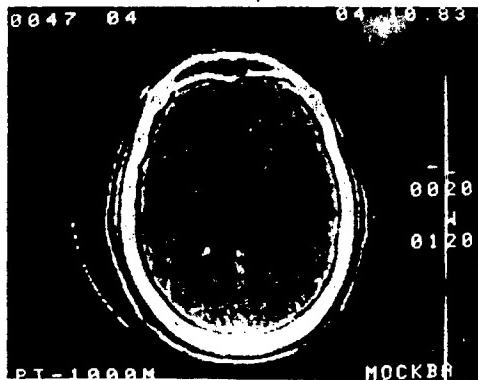


Fig. 2. Computer tomograph of patient B., 51 years old. In the right hemisphere of the brain, foci are defined of reduced density with clear contours in the middle third of the back femur of the inner capsule, measuring 1.1×0.8 cm, with distribution to the lenticular nucleus; in the head of the caudate nucleus, measuring 0.4×1.1 cm; periventricularly in deep sections of white matter of the upper third of the temporal convolution, measuring 0.8×1.1 cm. The front and back part of the right ventricle is weakly expanded.

Another advantage of the computer tomograph is the opportunity to evaluate bone damage of the skull. As an example of this, we could cite examinations of patient X, 24 years old, sent in connection with clinical suspicion of the presence of a depressed fracture and negative results from the traditional X-ray analysis (fig. 3).

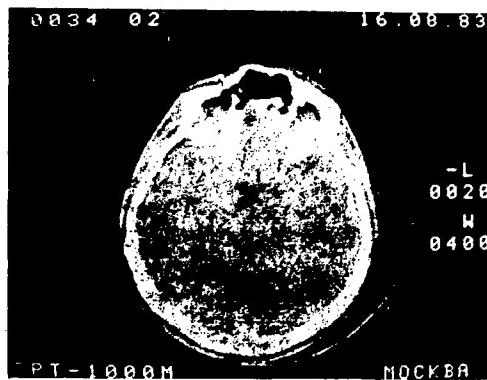


Fig. 3. Computer tomogram of the brain of patient X, 24 years old.

Basic pathological processes of the brain, as test results have shown, are also reflected sufficiently clearly. Zones of infarctions, hemorrhages, good quality and poor quality neoplasms and others are seen on tomograms, especially those completed after additional contrast intensification.

Thus, the first experiment on the usage of a computer tomograph on the SRT-1000M instrument makes it possible to sufficiently-highly evaluate diagnosis opportunities for precise recognition of brain diseases. Therefore, it is necessary to more energetically involve this method into the practice of medical institution operations. However, diagnosis opportunities of the computer tomograph are determined, to a significant degree, by the program security of the complex and the assembly of service instruments, which complete the computer.

Only their sufficiently complete assembly will allow the realization of all possibilities of the computer tomograph. In this sense, the SRT-1000M complex is much less secure than well known models. Therefore, the perfection and expansion of program security of the complex are urgently necessary.

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12473

CSO: 1840/1085

STERILE ENVIRONMENT SPEEDS WOUND AND BURN HEALING

Moscow IZVESTIYA in Russian 22 Aug 84 p 3

[Article by L. Ivchenko]

[Excerpt] Fundamental innovations are being introduced into traditional methods of wound and burn therapy. One such innovation is an original method developed by associates of the USSR Academy of Medical Sciences' Institute of Surgery imeni Vishnevskiy, which they call therapy in a controlled abacterial medium.

"Kind of sterile 'draft' blows into a plastic bag surrounding the injured area, creating an optimum micro-climate around the wound or burn," explained M. Kuzin, the institute's director and a member of the academy. "This makes it possible to fight microbes with greater success than by all existing methods taken together. It is because of infection that large wounds respond poorly to treatment by traditional methods. Here a stream of sterile air cleanses the wound and makes it possible to perform plastic skin surgery much sooner. As a result, the period of treatment is reduced to one-half to one-third."

The surgeons consulted with specialists of the "Energiya" association, their long-time partners in the development of certain ideas, who developed an experimental unit of very simple design. Sterile air is supplied to the ward through a common pipe, while at each bed an individual dosimeter is installed, by means of which the velocity of the stream of air and its pressure, temperature and humidity can be varied.

Commercial models of stationary and portable therapeutic units have not been developed. They are being produced by the "Odesskholodmash" production association. The association's specialists have also developed a unit for the general treatment of patients with severe burns over a large area: an entire bed fits easily into such a plastic "isolation ward."

The joint work of the institute's medical specialists and the industrial developers has been nominated for the 1984 USSR State Prize.

CSO: 1840/817

CRYSTALLOGRAPHY IN MEDICAL DIAGNOSIS

Moscow TASS International Service in Russian 1308 GMT 22 Aug 84

[Summary] Moscow, 22 August (TASS)--Soviet scientists have worked out a new method of using crystals to detect infinitesimal deviations from the norm in an organism. This is the first step to being able to diagnose illnesses at their inception. The well-known phenomenon of the crystallization of chemical elements in liquids when the liquids evaporate forms the basis for the new method. Any deviation from the norm in an organism also causes changes in the form of the crystals formed in this way. The complex designs of crystals can thus be compared. Compared with conventional research methods, analyses which use crystallography are much quicker and, most important, they can be carried out with the aid of the most basic apparatus found in any medical laboratory. Any biological fluid, such as blood, saliva or tears, can be investigated, and 2 mg of blood, for example, are sufficient for a diagnosis to be carried out. The new method can already help distinguish between tumorous, inflammatory and allergic conditions, as well as between a severe and a chronic kidney insufficiency. It can reveal brain tumors, and diagnose chronic tonsilitis and inflammatory and neoplastic diseases of the lungs and of many other internal organs. Doctors can also monitor in a reliable way the effectiveness of treatment being carried out, since the crystals "react" precisely to the degree of seriousness of an illness. The first experiments on the use of crystallography in the diagnosis of illnesses were carried out in the USSR in 1977. Since then, as a result of technology which has been developed, hundreds of photographs of crystals have been taken and the research which has taken place will provide the basis for an atlas which is being planned of crystallograms for use in diagnosis.

CSO: 1840/803

NEW 'SAORI-01' RADIOISOTOPE DIAGNOSTIC EQUIPMENT

Kiev PRAVDA UKRAINY in Russian 11 Jul 84 p 4

SIDOROV, Yu. M., "Medapparatura" Production Association Diagnostic Equipment Design Bureau, Kiev [reported by A. Krylov, engineer]

[Abstract] The "SAORI-01" radiodiagnostic unit is briefly described. The unit, which is essentially a gamma-camera used to detect various kinds of radioisotopes injected into the patient's body for diagnostic purposes, was developed by the "Medapparatura" Production Association jointly with the Leningrad All-Union Scientific Research Institute of Electrical Measuring Instruments and the Nevinomyssk Electrical Measuring Instrument Plant. The "SAORI-01" can be used in the diagnosis of pulmonary, cardiological and other diseases, with real-time visualization of isotope distribution.

No references.

[9642-1554]

MICROBIOLOGY

TRANSFERABLE RESISTANCE TO GENTAMYCIN AND OTHER ANTIBIOTICS BY
ENTEROBACTERIACEAE FROM MUNICIPAL SEWAGE

Prague ZHURNAL CIGIYENY EPIDEMIOLOGII MIKROBIOLOGII I IMMUNOLOGII in Russian
Vol 28, No 2, 1984 (manuscript received 27 Jan 83) pp 173-178

KRALIKOVA, K., KRCMERY, V., and KRCMERY, V. Jr., Scientific Research
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[Abstract] Study of resistance to gentamycin in Enterobacteriaceae strains from Bratislava municipal effluents and the transferability of multiple resistance of these strains was prompted by discovery, in effluents, in 1981, of Klebsiella pneumoniae, resistant to 7 antibiotics, including gentamycin. Strains (71) of Enterobacteriaceae and Psudomonas sp., isolated from sludges of 3 municipal sewage treatment plants, included 35 strains resistant to 2 or more antibiotics, including 12 gentamycin-resistant strains. These strains came from hospital patients. Resistance to gentamycin was found in 8 out of 48 strains from the Danube river and resistant to 2 or more antibiotics. Transfer of resistance to other antibiotics was demonstrated in 10 out of 24 strains resistant to 2 or more antibiotics. The study showed the possibility of the rise in reservoirs of strains with transferable resistance in municipal effluents and river water. They may play a major role in the ecology and epidemiology of R plasmids and in accidental spread of recombinant DNA molecules arising from gene engineering. Measures for preventing undesirable results from such occurrences are discussed.

References 11 Western.

[1582-2791]

STUDY OF O-ANTIGEN HETEROGENEOUS POPULATIONS OF VIBRIO CHOLERAE CULTURES

Prague ZHURNAL GIGIYENY EPIDEMIOLOGII MIKROBIOLOGII I IMMUNOLOGII in Russian
Vol 28, No 2, 1984 (manuscript received 10 Jan 83) pp 197-204

ANDRUSENKO, I. T., ALEKSANDROVA, I. K., PIDTILOK, Ye. A., VED'MINA, Ye. A.,
GIVENTAL', N. I., PASTERNAK, N. A., SHENDEROVICH, V. A. and SOBOLEV, V. R.,
Rostov-na-Don Scientific Research Institute of Epidemiology and Microbiology;
Central Institute of Advanced Training of Physicians, Moscow

[Abstract] Population composition of polyagglutinable cultures according to the O-antigen membership trait and changes of their agglutinability under various conditions of habitation near to normal were studied and discussed. *Vibrio cholerae* cultures (36), simultaneously agglutinating both cholera O1-serum and O-serums to NAG vibrions of the Sakazaki collection were studied with experiments showing that environmental influences and habitation conditions cause these cultures to dissociate into subdivisions distinguished by their membership in various serological groups according to O-antigen. Passage of these cultures through susceptible animals promoted preservation of O1-group clones and passage through peptide water or prolonged storage under unfavorable conditions gave an advantage to clones of another serological membership. It was assumed that the cultures of virions studied genotypically can form a series of O-antigens in addition to O-1 groups. Phenotypical appearance of O-antigenic structure in this or that part of individuals of a population depended upon habitational factors. References 13: 4 Russian, 9 Western.

[1582-2791]

R PLASMIDS IN NEONATES: TRANSFER OF MULTIPLE ANTIBIOTIC-RESISTANCE FROM PSEUDOMONAS AERUGINOSA TO ENTERBACTERIA (ENTEROBACTERIACEAE)

Prague ZHURNAL GIGIYENY EPIDEMIOLOGII MIKROBIOLOGII I IMMUNOLOGII in Russian
Vol 28, No 2, 1984 (manuscript received 6 Apr 83) pp 239-243

SECKAROVA, A., KRCMERY, V. and HAVLIK, J., Research Institute of Preventive Medicine, Bratislava, CSSR; Clinic of Infectious Diseases, Department of Pediatrics, Charles University, Prague, CSSR

[Abstract] Transfer of an R-plasmid complex carrying genes of resistance to gentamycin, tobramycin, azlocillin and classical antibiotics from *P. aeruginosa* to enterobacteria was described and discussed. The highly-transferable plasmid was found in more than 200 strains of Enterobacteriaceae of various species, isolated in various departments and wards of a large district hospital. The plasmid was readily transferred among intestinal bacteria and/or back to *P. aeruginosa*. The capacity for transfer was genetically inseparable from genes coding beta-lactamase. After 3 series of transfers, segregation began to appear, separating genes of beta-lactamase from genes controlling individual resistance to aminoglycoside antibiotics as well as determinants of

resistance to other antibiotics. The genetic structure of the plasma differed from the structure of plasmid found in *E. coli* strains isolated from neonates in the same department. References 4 Western.

[1582-2791]

UDC 577.17

KINETICS OF Δ^1 -DEHYDROGENATION OF HYDROCORTISONE AND OXYGEN UPTAKE BY FREE AND ADSORBED ARTHROBACTER GLOBIFORMIS 193 CELLS

Moscow BIORHIMIYA in Russian Vol 49, No 7, Jul 84
(manuscript received 24 May 83) pp 1080-1088

ARINBASAROVA, A. Yu., MEDENTSEV, A. G., AKIMENKO, V. K. and KOSHCHEYENKO, K. A., Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast

[Abstract] Studies were conducted on the kinetics of Δ^1 -dehydrogenation of hydrocortisone into prednisolone by free and cellulose-immobilized Arthrobacter globiformis 193 cells in relation to oxygen uptake. The polarographic studies showed that the reaction catalyzed by 3-ketosteroid- Δ^1 -dehydrogenase involves the electron transport chain, and that the transfer of reactants via the cell wall and the cytoplasmic membrane is not the limiting factor in hydrocortisone transformation. Rather, dehydrogenation of hydrocortisone is limited by electron transfer along the respiratory chain, and is independent of the oxygen concentration in the range of 8 to 250 μM ($K_m = 1.9 \mu\text{M}$ for O_2). The kinetics of the reaction follow the Michaelis-Menten equation, yielding values of $K_m = 90 \mu\text{M}$ for hydrocortisone and $V = 165 \text{nmoles} \cdot \text{min}^{-1} \text{mg}^{-1}$ dry cells for both the free and immobilized preparations. Under optimal conditions (10 mM tris-phosphate buffer, pH 7.0, 22-25°C) oxygen supply is the key factor determining continuous transformation of hydrocortisone into prednisolone in a column apparatus. Figures 8; references 15: 9 Russian, 6 Western.

[1572-12172]

MILITARY MEDICINE

IMPORTANCE OF MILITARY MEDICAL WORKERS IN ACCOMPLISHING SOCIALIST GOALS

Moscow MEDITSINSKAYA GAZETA in Russian 13 Jun 84 p 4

[Interview with I. A. Yurov, Lieutenant General of the Medical Service, by TASS correspondent: "Recognizing The Importance of One's Work" Date and place not specified]

[Text] On June 17, the Soviet people and their armed forces mark Medical Workers' Day. On the eve of the holiday the first deputy chief of the Central Military Medical Directorate of the USSR Ministry of Defense, Lieutenant General of the Medical Service I. A. Yurov answered a TASS correspondent's questions.

[Question] Please tell us about the contribution of Soviet military medical personnel to the business of putting the sick and wounded troops back into action during the past war.

[Answer] At regiment medical stations, in medical hygiene battalions and army and front hospitals, intensive work was done on medical first aid for the sick and wounded, surgical operations were performed, the most effective means were employed--a struggle was waged for the life and health of every wounded person. Millions of recovered soldiers went back into action for the duration of the struggle with the enemy.

In a most direct matter, the work of the Medical Service affected the condition of the armed forces, their fighting efficiency, staff makeup of the field forces, and replenishment of lost personnel. Here are just two examples. In the first half of 1944, it was possible to make up 50 divisions of that time with soldiers returned to action by the Medical Service of the 1st Ukrainian Front. During the last two years of the war, the Medical Service of the 2nd Ukrainian Front returned 1,500,000 troops to action.

[Question] What are the tasks facing the Medical Service at present?

[Answer] The Soviet armed forces are equipped with modern combat technology and weaponry. They have everything they need to safely preserve the achievements of socialism and, if an aggressor tries to test our strength, to deliver a crushing blow.

Under the current tense international situation, constant high combat readiness of the army and navy acquires particular significance. The health of the soldiers is one of the most important factors in the achievement of this goal today.

First of all, it must be noted that military work is being saturated to an ever-increasing degree with elements of administrator activity. The process of using military technology and weaponry is taking on the nature of solving administration problems in a "Man - Machine - Environment" system. It takes place under extremely tense conditions, often approaching extremes, when time is scarce and under abruptly changing circumstances. Of course, all of this causes an increase in demands upon man and his health, especially on neuropsychological stability.

The Medical Service and its specialists and scientists have worked out scientifically based norms and hygiene requirements determining optimum conditions for military work. These norms and requirements are called upon on the one hand, to provide effective use of combat technology and armament and, on the other hand, to guarantee that the staff's health will be maintained while the tasks are being fulfilled and that optimum conditions will be created for its professional and work activity, by giving the maximum amount of consideration to the psychophysiological capacities of the people who will work with this technology.

Recommendations of the Medical Service are taken into consideration when new forms of combat technology are created and when the procedures for its operation are developed. This is indeed a fundamental task--to more effectively use the combat possibilities of the technology that has been developed without detriment to the health of the staff. The second important direction is in searching for hidden resources in man, revelation of those conditions and procedures under which these reserves can be uncovered more fully.

At the same time, no matter how efficiently the professional activity of the staff is organized, physical and emotional overloads and exhaustion occur after fulfillment of complex battle-training quotas. Special clinics [profilaktoriy] and holiday homes have been established in the army and navy to help the soldiers get rid of these symptoms and fully regain their ability to work. The existing network of military sanatoria is widely used. For example, sailors relax there after long voyages and fliers rest before completing flights.

[Question] Please tell us about the successes of military medical personnel, about the best people.

[Answer] The medical staff of the Soviet Army and Navy approach their professional holiday, Medical Workers' Day, with new achievements. Preventive and therapeutic-diagnostic work is being improved in military okrugs, groups of forces and in the navy; the effectiveness of disease prevention measures is increasing. New effective methods and means are being introduced to the practice of medical care. All of this enables more successful solution to an important task--maintaining and improving the health of the Soviet troops.

The results that have been attained are the result of intensive work on the part of military medical personnel, their high responsibility and creative attitude toward their work. Many generals and officers of the Medical Service have been honored with high awards for exemplary fulfillment of their medical duty and successes in combat and political training. Thus, L. N. Shelenkov, a Captain in the Medical Service, was awarded the Order of the Red Star, A. G. Radchenko, Captain in the Medical Service was awarded the medal "For Combat Services." Senior Lieutenant of the Medical Service A. B. Bulychev, chief of a unit [chast'] medical station achieved high work ratings. The subunit [podrazdeleniye] headed by him was acknowledged to be one of the best in terms of annual results in the Group of Soviet Forces in Germany.

A large group of our scientists were honored with election to the USSR Academy of Medical Sciences for achievements in the development of military medicine. Thus, Colonel General of the Medical Service N. G. Ivanov, chief of the Military Medical Academy imeni S. M. Kirov, was chosen as an active member of the USSR Academy of Medical Sciences. Chief Surgeon of the USSR Ministry of Defense and Lieutenant General of the Medical Service K. M. Lisitsyn, Chief Internist of the USSR Ministry of Defense and Lieutenant General of the Medical Service Ye. V. Gembitskiy, Chief X-Ray Technician of the USSR Ministry of Defense and Major General of the Medical Service A. N. Kishkovskiy, and chief of the Faculty of Normal Physiology of the Academy and Colonel of the Medical Service V. I. Medvedev were made corresponding members of the USSR Academy of Medical Sciences.

I could name many others, but I want to emphasize what is important--that today the entire medical staff of the USSR armed forces is trying to work better than yesterday, in that they will more clearly recognize the enormous importance of their labor, which is a direct contribution to strengthening the defensive power of our socialist native land.

12262
CSO: 1840/767

PHARMACOLOGY AND TOXICOLOGY

PHARMACEUTICALS OF 21st CENTURY

Kiev PRAVDA UKRAINY in Russian 20 Apr 84 p 4

[Interview with V. K. Lishko, academician, USSR Academy of Sciences, director of the Biochemistry Institute imeni A. V. Palladin and deputy chairman of the organization committee, by Yu. Vilensky; data and place not specified]

[Text] A conference starting in Kiev today, "The directed transport and immobilization of biologically active drugs for clinical practice" could have this slogan: "The crown of scientific work is prophesy". The nature of this research is finding the most efficient paths for medicines which were not possible before, and the introduction of their fundamentally new forms. In essence, this is a conversion of medicine to a "faster direction".

V. K. Lishko, academician, USSR Academy of Sciences, director of the Biochemistry Institute imeni A. V. Palladin and deputy chairman of the organization committee, answers questions of "Pravda Ukraina".

Q.--Valeriy Kazimirovich, prominent scientists and leaders of new trends deal with complex problems. What does the conference offer on this subject?

A.--It has gathered the best of Soviet science in the field of medicine, physiology and biochemistry. Its initiator is Hero of Socialist Labor, Academician Ye. I. Chazov, who pioneered the introduction into medicine, primarily into emergency cardiology, of original, quiet "magic pellets", when drugs act continuously and selectively, somehow fulfilling the function of an auxiliary heart. His forthcoming report on problems of medicinal therapy in cardiology based on these original methods promises to be very interesting.

Membrane transport could be called one of the continuous flows of active life, the circulation of substances through the membrane of living cells. Academician P. G. Kostyuka is presenting a panorama of this process which is unseen by the naked eye.

Today, more and more attention is being directed to the use of magnetic fields. They are amazing guides for medicine in special form. Directed movement of medicines in magnetic micro-carriers is the theme of USSR Academy of Sciences Academician K. S. Ternoviy's presentation.

A fantasy of realism is how I would have characterized another series of presentations by scientists of Moscow, Kiev, Khar'kov and L'vov.

Q.--The Institute of Biochemistry of the USSR Academy of Sciences is among the conference organizers, along with the All-Union Cardiology Scientific Center of the USSR Academy of Medical Sciences, the USSR Ministry of Health. And, the Institute of Biochemistry, UkrSSR Academy of Sciences. How is its work characterized vis-vis the discussed questions?

A.--Jointly with the Institute of Physiology of the USSR Academy of Sciences, we are actively participating in modeling liposomes, vectors of drugs in the body, based on natural cellular membrane materials. Such micro-bubbles are capable of penetrating into the smallest intercellular spaces. It is possible to solder liposomes to certain cells and to manipulate them with a consideration of their electrical discharge. The horizons of this direction are really astonishing.

Q.--Along with chemists, biologists and experimental oncologists, pharmacologists and representatives of practical medicine are also participating in the conference. Some methods, perhaps, upset the usual concepts. For example, the idea of using insulin in a liposome form, that is, without injections, the introduction of enzymes in bio-compatible carriers and fat in the form of liposome for intravenous feeding. Please say a few words about this aspect of the conference.

A.--This is actually a step out into the orbit of the newest achievements of science and clinical thought. In addition to the themes you mentioned, I can add development of low-temperature preservation of liposomes which contain antibiotics, the use of liposomes in X-ray and isotope diagnosis, successful application of these capsules with drugs, smaller than a micron, for treatment of diseases of the joints, and, interferon in liposomes.

We began our conversation with a classical phrase. Let us finish it with the [re-translated] words of Shakespeare: "Where the thought is strong, the action is full of strength".

PROBLEMS OF IMMUNITY AND ROLE OF GENES DISCUSSED AT CONFERENCE

Moscow IZVESTIYA in Russian 2 Jul 84 p 2

[Excerpts from article by IZVESTIYA special correspondents Ye. Manucharova and M. Kromchenko, reporting on 16th FEBS [Federation of European Biochemical Societies] Conference: "The Perpetuity of the Living"]

[Excerpts] The method of expert analyses inevitably brought us to problems of nonsusceptibility--immunity. The FEBS organizing committee allotted three symposia and organized roundtable discussion for their consideration. In any case, this theme was also sounded in many other halls. In essence, all conference participants wish, while being aware of the rules of the development of life, to make our body resistant, immune, capable of withstanding any environmental effects. Is this not why the first lecture of the gala evening closing the conference, by Professor K. Rayevskiy from the Federal Republic of Germany, dealt directly with immunity problems? And the second, by USSR Academy of Sciences Corresponding Member G. Georgiyev promoted understanding of how immunity is responsible for the formation of cancer cells. It was devoted to moving, changing genes.

The work of Soviet scientists, USSR Academy of Medical Sciences Academician R. Petrov (Moscow) and Professor Ye. Korneva (Leningrad), has made a substantial contribution to understanding regulation. A new class of physiological-ly-active substance-regulators (called myelopeptides) were observed in the bone marrow. The force and the rate of the immune response is connected to these substances, sent by the brain.

12262
CSO: 1840/1621

ANTIARRHYTHMIA PREPARATION WINS STATE PRIZE NOMINATION

Moscow MEDITSINSKAYA GAZETA in Russian 27 Jul 84 p 3

KHARKEVICH, D., member USSR Academy of Medical Sciences

[Abstract] The article reports on results of research carried out over a period of many years by a group of chemists and pharmacologists of the USSR Academy of Medical Sciences' Institute of Pharmacology in collaboration with electrophysiologists and clinicians of the academy's All-Union Cardiology Research Center and personnel of the "Olaynfarm" chemical and pharmaceutical production association. Results of this project are presented in a work entitled "Development and Introduction, into Broad Medical Practice, of a New Group of Highly Effective Medicinal Preparations for the Prevention and Treatment of Impairments of Cardiac Rhythm," which has been nominated for the USSR State Prize. The authors of this work are identified. They are credited in particular with the development of preparations of low toxicity, which are called "etmozin" and "etatsizin." Etmozin is said to be effective chiefly against auricular and ventricular arrhythmias. As compared with etmozin, the antiarrhythmic effect of etatsizin is said to be twice as intense and four to five times as prolonged.

CSO: 1840/717

COMPARISON OF MUTAGENIC ACTIVITY OF AFLATOXIN B IN CRICETULUS GRISEUS AND
MACACA MULATTA

Prague ZHURNAL GIGIYENY EPIDEMIOLOGII MIKROBIOLOGII I IMMUNOLOGII in Russian
Vol 28, No 2, 1984 (manuscript received 1 Apr 83) pp 161-171

BARTA, I., ADAMKOVA, M., MARKARYAN, D., ADZHIGITOV, F., and PROKES, K.,
Medical Faculty of Hygiene, Charles University, Prague; Institute of
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Institute of Experimental Pathology and Therapy, Academy of Medical Sciences,
Sukhumi; Oncological Laboratory, Department of General Medicine, Charles
University, Prague

[Abstract] Mutagenic activity of aflatoxin B after a single Charles intraperitoneal injection into Chinese hamsters (*Cricetus griseus*, male, 2-3 months old, average weight 2.5 g) and macaques (*Macaca mulatta*, male, 3.5 years old, weight 2.5-4.5 kg) was assessed by studying the presence of chromosomal abnormalities in brain cells. Mutagenic activity of aflatoxin B was tested in Chinese hamster brain cells after single intraperitoneal injections of 0.001, 0.01, 0.1, 1.0 and 5.0 mg/kg at 24 hour intervals up to the 5th day after injection. All doses caused significant increase of frequency of occurrence of aberrant cells over that found in control animals injected with a 7 percent solution of DMSO. After injection of 5 mg/kg of aflatoxin B, frequency of presence of aberrant cells and chromosomal breaks was considerably higher than control figures throughout a 92-day period of observation after injection. Occurrence of chromosomal abnormalities after injection of 0.1 or 1.0 mg/kg of aflatoxin into macaques was significantly higher than that for control animals throughout 730 days of observation. Possible causes of long-term presence and great fluctuation of chromosomal abnormalities after a single injection of aflatoxin B were discussed.

Figures 6; references 22 Western.

[1582-2791]

UDC 543.8:612.822.1

OPIATE RECEPTOR STABILITY IN FRESH AND LYOPHILIZED RAT BRAIN MEMBRANE PREPARATIONS

Moscow BIORKHIMIYA in Russian Vol 49, No 7, Jul 84
(manuscript received 13 Sep 83) pp 1127-1133

ZAYTSEV, S. V., KUROCHKIN, I. N., SERGEYEVA, M. G., and VARFOLOMEYEV, S. D., Laboratory of Molecular Biology and Bioorganic Chemistry imeni A. N. Belozerskiy, Moscow State University imeni M. V. Lomonosov

[Abstract] Membrane preparations from Wistar rat brains were employed in a study to determine the extent of opiate receptor stability of lyophilized and frozen preparations. Binding studies at 37°C in phosphate-HEPES buffer, pH 7.4, following storage at 0°C for various periods of time, revealed different rates of loss of receptors binding μ -ligands (naloxone and morphine) and δ -ligands (D-Ala²,D-Leu⁵)enkephalin (DADL). The results showed that lyophilized preparations, even when stored at room temperature with argon in sealed ampules for 3 months, retained full activity. However, frozen receptor preparations lose binding activity in the course of a month when kept at -13°C or -35°C. Both high and low affinity receptors were detected for morphine and DADL, with the δ -receptors showing somewhat greater stability than the μ -receptors. These observations indicate that lyophilized preparations may constitute suitable reagents for standardization studies. Figures 6; references 17: 5 Russian, 12 Western.

[1572-12172]

UDC 577.2

BINDING SITES FOR OPIATES AND ENDOGENOUS OPIOIDS IN TOAD (BUFO VIRIDIS) OOCYTES

Moscow BIORKHIMIYA in Russian Vol 49, No 6, Jun 84
(manuscript received 28 Sep 83) pp 883-888

BAKALKIN, G. Ya., YAKOVLEVA, T. V., KOROBON, K. P., BESPALOVA, Zh. D., VINOGRADOV, V. A. and TITIOV, M. I., Central Scientific Research Laboratory, USSR Ministry of Health, Moscow; All-Union Cardiological Center, USSR Academy of Medical Sciences, Moscow

[Abstract] Oocyte membranes derived from the toad *Bufo viridis* were employed in binding studies with opiate antagonists, opiates, and endogenous opioids to further expand knowledge regarding the role of endorphins in oocyte physiology. Tritiated naloxone bound to the receptors in a reversible manner with much higher affinity than morphine or (D-al²,D-leu⁵)enkephalin (DADL). Bound radiolabeled naloxone is readily displaced by unlabeled naloxone and bremasocine (κ agonist), morphine (μ agonist) and SKF-10,047 (sigma agonist) are less efficient competitors, while DADL (delta agonist), β -endorphin (ϵ agonist) and other neuropeptides were essentially noncompetitive. Scatchard

plots revealed both high ($K_d = 15$ nM) and low ($K_d = 10^3$ nM) affinity binding sites for naloxone; the concentration of the high affinity sites (16 pmoles/mg protein of oocyte homogenate) was 20-50-fold greater than their concentration in the toad or frog brain. Concomitantly, oocyte extracts were capable of competitive inhibition of tritiated naloxone binding and inhibited contraction of the vas deferens of rabbits and mice. Inhibition of the smooth muscle preparation was also exhibited by bremasocine, but not by morphine, DADL, or SKF 10,047. The findings were interpreted as proof for the existence of opiate-like kappa agonists in the oocytes that may be involved in oocyte development and maturation. Figures 4; references 15 Western.

[1571-12172]

NEW ANTICOAGULANT PRODUCED

Tallinn SOVETSKAYA ESTONIYA in Russian 17 Jul 84 p 3

UNATTRIBUTED

[Abstract] A powerful new anticoagulant developed at the Belorussian Scientific Research Institute of Epidemiology and Microbiology is described. The agent--tseliaza--is derived from the streptococcal component streptase. It is capable of dissolving blood clots in 20-90 minutes and is designed for use in the treatment of cardiac infarction, ischemic cerebral stroke, and other serious diseases. According to academician of the USSR Academy of Medical Sciences V. Votyakov, director of the above-mentioned institute, clinical testing of the drug has now been successfully completed. Dozens of patients receiving it have been restored to good health. Physicians like the drug because, compared with foreign-made analogues, it has no side effects. A production line for tseliaza has now been set up at the institute. Production capacity will be sufficient to satisfy demand from surgical departments throughout the USSR. No references.

[9642-1553]

PHYSIOLOGY

UDC 577.352.5

ACTIVATION AND INACTIVATION OF BATRACHOTOXIN-TREATED SODIUM CHANNELS IN FROG NERVE FIBERS

Kiev NEYROFIZIOLOGIYA in Russian Vol 16, No 1, Jan-Feb 84
(manuscript received 22 Jun 82) pp 18-26

MOZHAYEVA, G. N., NAUMOV, A. P. and KHODOROV, B. I., Institute of Cytology, USSR Academy of Sciences, Leningrad; Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] The voltage-clamp technique was employed in assessing the effects of batrachotoxin (BTX) on the functional status of sodium channels following depolarizing shifts in the membrane potentials of the node of Ranvier in frog (*Rana ridibunda*) nerve fibers. BTX induced a shift in the voltage-dependent activation of sodium channels of 67 mV toward greater hyperpolarization, in which the plot of the proportion of open channels vs. potential showed no change in slope. These observations indicated that BTX, while displacing the activation curve of the sodium channels toward more negative potentials, did not alter the sensitivity of the gating mechanism to changes in the electrical field on the membrane. Studies with membranes showing potential displacements in the range from +80 mV to -40 mV, eliciting entrance and exist currents, respectively, demonstrated that pre-depolarization for 50 msec diminishes both current types and alters "instantaneous" currents due to repolarization. These observations were consonant with partial inactivation of the sodium channels. In addition, the high degree of stationary permeability of the BTX-treated channels indicates that BTX favors open channels and that its effects are fundamentally different from those of pronase.

Figures 6; references 21: 7 Russian, 14 Western.

[776-12172]

UDC 616.894.02:615.711.1

EFFECTS OF ELECTROCUTANEOUS STIMULATION ON BIOGENIC AMINE AND ENDOGENOUS OPIATE PEPTIDE LEVELS IN BRAIN, ADRENALS AND BLOOD OF RATS

Yerevan NEYROKHIAMIYA in Russian Vol 3, No 1, Jan-Mar 84
(manuscript received 24 May 82) pp 3-11

BRUSOV, O. S., NECHAYEV, N. V., TIGRANYAN, R. A., VAKULINA, O. P., LOSHCHILOV, V. I., MIRONENKO, Yu. P., NEVSKIY, D. I. and PANICHENKO, L. F., All-Union Scientific Research Institute of General and Forensic Psychiatry imeni V. P. Serbskiy, USSR Ministry of Health; Higher Technical Secondary School N. E. Bauman, Moscow

[Abstract] Wistar rats were employed in analysis of the effects of electrocutaneous stress on several cardiovascular parameters and humoral neuroregulatory mechanisms involving endogenous opioids. The stimulus was found to elicit a sharp rise in arterial blood pressure and induce tachycardia as an immediate effect; within 30 min the immediate effects were replaced by parasympathetic predominance evident in the onset of hypotension and bradycardia. The pain threshold in the experimental animals was elevated for an hour after the stimulus and within 24 h had returned to baseline level. Concomitantly, these changes were accompanied by an increase in the concentration of met-enkephalin-like substances in the adrenal glands and of leu-enkephalin in the midbrain and the hypothalamus. The stimulus also evoked an immediate increase in the plasma concentration of β -endorphin, and its fall in the pituitary. The concentrations of biogenic amines (epinephrine, dopamine, norepinephrine) and met-enkephalin remained elevated 24 h after the electrocutaneous stimulus in the various brain structures and the blood. These observations point to complex interactions among the various neurohumoral factors in determining gross physiological responses to stress and concomitant onset of adaptive mechanisms.

Figures 2; references 31: 11 Russian, 20 Western.

[781-12172]

UDC 612.014.464

EFFECTS OF HELIUM-OXYGEN GAS MIXTURE ON OXYGEN TRANSFER ACROSS BLOOD-PARENCHYMAL BARRIER

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 30, No 4, Jul-Aug 84
(manuscript received 9 Mar 82) pp 454-459

NOSAR', V. I. and ZHIVOTOVSKAYA, N. A., Institute of Physiology imeni A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] In view of the controversy regarding the effects of helium on oxygen transport across blood-parenchymal barriers, studies were conducted on Chinchilla rabbits to evaluate pertinent transfer parameters using air, normo- and hyperoxic helium-oxygen gas mixtures, and a hyperoxic nitrogen-oxygen mixture. Using a model system consisting of the gastrocnemius muscle

showed that inhalation of a normo-oxic helium-oxygen mixture (21% O₂ + 79% He) resulted in a marked increase in the transport of oxygen across the barrier. This was essentially ascribed to an increase in the oxygen arterio-venous concentration gradient, improvement in regional blood flow, and increased permeability to oxygen of the parenchymal barrier. However, the oxygen tension in the muscle was reduced to a statistically significant extent. Use of hyperoxic mixtures (40% O₂ + 60% He or 40% O₂ + 60% N₂) resulted in a marked reduction in oxygen transfer due to a sharp decrease in the rate of the local blood flow and a decrease in parenchymal permeability to oxygen, with the effects being more pronounced with the helium mixture. Figures 3; references 20: 11 Russian, 9 Western.
[780-12172]

UDC 612.822.3

PREFERENTIAL BLOCKAGE OF RAPID-CURRENT POTASSIUM CHANNELS BY 4-AMINOPYRIDINE IN MOLLUSCAN NEURONS

Leningrad FIZIOLOGICHESKIY ZHURNAL in Russian Vol 69, No 11, Nov 83
(manuscript received 2 Feb 83) pp 1420-1426

VISLOBOKOV, A. I., KRYLOV, B. V. and AKOYEV, G. N., Chair of Human and Animal Physiology, State University imeni A. A. Zhdanov; Reception Physiology Laboratory, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad

[Abstract] Intracellular dialysis and voltage-clamp techniques were applied to isolated molluscan (*Lymnea stagnalis*) parietal and visceral ganglia to evaluate the effects of 4-aminopyridine (4-AP) on the different potassium channels. Evaluation of the rapid-current channels (I_A), delayed potassium current (I_K) and inward currents (I_I) following external application of 4-AP yielded apparent dissociation constants of 0.4 mM for I_A (E = -40 to -30 mV), 24 mM for I_K (E = 20 mV), and 6.5 mM for I_I (E = -10 to -20 mV). The respective constants obtained with intracellular 4-AP were 0.85, 55, and 77 mM, as calculated by the Langmuir equation. It is evident, then, that 4-AP acts as a selective blocker of the rapid-current potassium channels when introduced intracellularly in a concentration of 10-15 mM. While the use of the Langmuir equation provides a first approximation of rapid channel blocking, the possibility remains open that inactivation of these channels may follow second order kinetics. Figures 4; references 12: 4 Russian, 8 Western.
[775-12172]

EFFECTS OF BIOACTIVE AGENTS ON REFLEX DISCHARGES AND ELECTROTONIC POTENTIALS OF ISOLATED RAT SPINAL CORD ROOTS

Leningrad FIZIOLOGICHESKIY ZHURNAL in Russian Vol 69, No 11, Nov 83
(manuscript received 9 Mar 83) pp 1433-1440

ABRAMETS, I. I. and KOMISSAROV, I. V., Chair of Pharmacology, State Medical Institute imeni M. Gorkiy, Donetsk

[Abstract] Isolated spinal cord preparations obtained from 7-14 day old rats were used to study the ionic basis of postsynaptic potentials generated by various neurotransmitters. Evaluation of the electrophysiological data demonstrated that the electrotonic potentials of the ventral roots elicited by GABA, glycine, norepinephrine and dopamine are Cl^- -dependent, while those evoked by L-glutamic acid and serotonin are largely Na^+ -dependent. Substance P-induced electrotonic potentials in the ventral roots were also found to be dependent on the Cl^- concentration in the bathing medium. Evaluation of the data for the dorsal roots showed that depolarization of the primary afferent fibers induced by GABA is Cl^- -dependent, while the glycine-and-serotonin-evoked depolarization was Na^+ -dependent. The potential of a dorsal root elicited by electrical stimulation of the dorsal root of an adjacent segment was almost completely abolished by bathing solutions with low sodium or chlorine concentrations, while in hypokalemic solutions the amplitude of the potential was increased and, conversely, diminished in hyperkalemic solutions. Figures 3; references 16: 6 Russian, 10 Western.

[775-12172]

PSYCHOLOGICAL ASPECTS OF EVALUATION AND PROGNOSIS OF EFFECT OF HYPOTENSIVE DRUGS ON RELIABILITY AND EFFICIENCY OF WORK OF TRANSPORTATION WORKERS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 3, May-Jun 84
(manuscript received 26 Jul 82) pp 109-119

NERSESYAN, LEV, SERGEYEVICH, candidate of psychological sciences, head of the Laboratory of Psychophysiology and Occupational Selection of the All-Union Scientific Research Institute of Railroad Hygiene and BUREKHZON, YEVGENIY, GRIGOR'YEVICH, Junior Scientific Associate of Laboratory of Psychophysiology and Occupational Selection of the All-Union Scientific Research Institute of Railroad Hygiene

[Abstract] Effect of hypotensive drugs on preparedness for emergency action was assessed in a laboratory modelling experiment on a group of drivers and assistant drivers with 1st degree or 2d degree hypertension. Patients were studied before prescription of hypotensive drugs and after a week of treatment by the use of "double blind control" and a placebo in 2 independent series of experiments. Use of courses of some hypotensive drugs had a bad effect on psychological components of reliability and driving efficiency of

drivers. All of the drugs studied, except the beta-adrenoblockers and combinations of them and combinations including psychostimulators, greatly reduced drivers' readiness for emergency action. Steadiness of readiness for emergency action after use of hypotensive drugs was determined by the background level of this quality and motivational and personality traits. Persons with average or poor readiness for emergency action and (or) with high intraversion and poor self-control were considered to be poor risks. Instructions for use of domestic hypotensive drugs should warn against drivers using them while working. References 63: 37 Russian, 26 Western.
[745-2791]

UDC 591.1.574/578/576.2

PASSIVE TRANSPORT OF SODIUM IN EPITHELIAL CELLS: METHODS OF STUDY, CHARACTERISTICS, REGULATION AND IMPORTANCE

Moscow USPEKHI FIZIOLOGICHESKIKH NAUK in Russian Vol 15, No 3, Jul-Sep 84
pp 23-41

METEL'SKIY, S. T., Scientific Research Institute for Biological Testing of Chemicals, Kupayna, Moscow Oblast

[Abstract] A review of largely Western literature is presented on the current state of knowledge regarding passive transport of sodium in epithelial cells, centering primarily on the advances made in the late sixties through the early eighties. The review covers methods of study, characteristics of the mechanisms involved and of the sodium channels themselves, and the importance of such transport to cell function and health. Analysis is made of the differences between passive sodium-transport in excitable and non-excitable tissues, with primary emphasis on the apical portion of the epithelial cell membrane. In general, the methods of study that have been most successfully utilized include the use of radioisotopes, electrophysiological techniques, "unpolarized" preparations (one side in contact with aqueous phase, the other with hydrophobic phase), fractionation, pharmacologic stimulants and inhibitors of sodium transport, and so forth. The review also covers the structural, physico-chemical and enzymatic characteristics of such channels, control mechanisms, and coupling of sodium transport to other metabolic events. References 112: 14 Russian, 98 Western.
[782-12172]

UDC 612.821.6+612.822.3+615.78

MICROINJECTOR FOR NEUROPHARMACOLOGIC STUDIES ON FREELY-MOVING ANIMALS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 34, No 2,
Mar-Apr 84 (manuscript received 29 Jul 83) pp 381-383

TREPAKOV, V. V., LATANOV, A. V. and YERCHENKOV, V. G., Laboratory of
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Oblast

[Abstract] Cursory description is provided of a microinjector for neuropharmacologic studies on freely-moving animals, which is based on an electrolytic microinfusion transducer [Bozarth, MA, et al., J. Neurosci. Meth., 2(3): 273, 1980]. Basically, a capillary pipette is used to create an electrolytic chamber supplied with a copper (cathode) and a carbon (anode) electrode, and connected to the brain tissue via a cannula. Application of 0.2-0.5 A current yielded controlled-dose volumes ranging from 0.33 to 0.66 μ L, with a reproducibility of \pm 3.4%. The system was successfully tested on a freely-moving rabbit for intracerebral injection of 10^{-5} M GABA into the visual cortex, which diminished spontaneous electrical activity and specific responses to visual stimuli. Using glass micropipettes, an injector has been devised with a terminal diameter of 1.5-2 μ m. Figures 2; references 5: 3 Russian, 2 Western.

[791-12172]

UDC 612.82/.83+612.82+612.821.8

CONSCIOUS AND UNCONSCIOUS IN HUMAN HIGHER NERVOUS ACTIVITY

Moscow ZHURNAL VYSSHEY NERVNOYS DEYATEL'NOSTI in Russian Vol 34, No 3,
May-Jun 84 (manuscript received 31 Aug 83) pp 403-411

KOSTANDOV, E. A., All-Union Scientific Research Institute of General and
Forensic Psychiatry imeni V. P. Serbskiy, Moscow

[Abstract] The problem of the conscious and unconscious in higher functions of the nervous system is discussed from the philosophical viewpoint of dialectical materialism. More often than not, in an attempt to avoid introducing "subjective" concepts into their research, neurophysiologists and psychologists neglect taking into consideration the consciousness factor. In such an approach consciousness and unconsciousness are regarded (or neglected) as subjective sidelines of "objective" physiological and biochemical processes occurring in the higher centers of the brain which determine behavior. It is only relatively recently that the first steps have been taken in evaluating the critical cerebral events which underlie conscious perception of external stimuli, and which go beyond information projection and processing per se. It is becoming increasingly apparent that

conscious perception has a time factor prerequisite in the form of P₃₀₀ wave latency, requires interhemispheric cooperation, and that the diencephalon has a crucial role in such events. References 35: 17 Russian, 18 Western. [783-12172]

UDC 612.822.3

AMPLITUDE-FREQUENCY RESOLUTION OF MULTISPIKE SIGNALS

Moscow ZHURNAL VYSSHEY NERVOY DEYATEL'NOSTI in Russian Vol 34, No 3, May-Jun 84 (manuscript received 22 Sep 83) pp 578-580

CHIRKOV, V. D., NIKOLAYEV, G. A. and KOVALEV, V. Yu., Medical Institute imeni S. M. Kirov, Gorkiy

[Abstract] The problem of isolating and identifying spikes produced by the discharge of a single neuron, and which are picked up by extracellular microelectrodes, was addressed by computer assisted analysis of amplitude-frequency spectra. Studies on adult cats and evaluation of the oscillogram patterns with amplitude-frequency characteristics of the spikes, demonstrated that 30-40 dB spectral band widths can serve as a reliable criterion for spike isolation. This is based on the fact that the extracellular medium affects the spike from a single neuron in the manner of an RC filter. Changes in the shape of the spike are due largely to phasic changes among the different components of the spectrum, but the band width remains unaffected, Figures 1; references 3 Russian.

[783-12172]

PUBLIC HEALTH

DRAWBACKS IN MEDICAL CARE FOR WOMEN

Moscow MEDITSINSKAYA GAZETA in Russian 22 Aug 84 p 2

[Article by I. Yevsinkova, MEDITSINSKAYA GAZETA correspondent, "The Barometer was Stuck at Bad Weather; The Sad Tale of One Women's Consultation"]

[Text] Oktyabrskiy Rayon is one of the oldest in Novosibirsk. Nevertheless, it is growing, new families are being added to it and the birth rate is increasing. The women's consultation at Maternity Home No 2 is already serving more than 70,000 persons at this time: enterprise and construction workers, scientific research institute and planning institute associates, young people at VUZ's and teknikums. How are the problems of maternity and pediatric care being solved here?

If it is true that the registration area is the barometer of the operative condition of a polyclinic, then it is predicting a storm. People are crowding in line even at non-peak hours; they are nervous, and registration workers are running their legs off to establish order. All is confusion.

"Self-registration is impossible to organize," says an elderly registration worker. "Crowds! And uchastoks were even added here; they were transferred from the branch..."

As was explained, a consultation branch had been closed because of the deplorable condition of its facilities back in April, but up until now renovation has not begun. All services are now crammed into 300 square meters, and, indeed, this area is far from being well managed. There are only two physician's offices that are in more or less standard condition. The rest are set up in a former lobby, with the help of thin partitions and screens. In each one, two or three physicians see patients simultaneously; they also perform therapeutic procedures here. In the halls there is nothing for women to sit on and nowhere for them to stand. Waiting rooms are filled to the limit. The physician, working at a time-and-a-half rate, must see 15-20 patients in addition to his own during these same hours--the next shift is crowding. On other days, only three physicians out of the ten remaining in eighteen uchastoks will see patients. In certain uchastoks, midwives see patients.

Personnel turnover at the consultation office is high. There have been four chiefs in the last five years. Seven physicians were discharged during the year. Midwives and nurses are leaving. In fact, there are many excellent contemporary polyclinics and women's consultations in the city where staff as well as patients are taken care of.

Under these circumstances, it is difficult to hold anyone accountable for unfinished work, and there is a great deal of it. More than one-third of women preparing to become mothers did not undergo a general physical examination, as prescribed in the early stage of pregnancy. Visits to highly specialized physicians have practically ceased. Gynecological disease prevention leaves much to be desired. There is a shortage of technological equipment and implementation of new diagnostic and treatment methods is slow.

Such a level of medical care is certainly not convenient for the women. Complaints are being made in various instances. Commissions are being created to review them. Everyone is coming to the conclusion that the fundamental source of the predicament is the weak facility. This question has been raised several times at the session of the Rayon Council of People's Deputies and at gorispolkom meetings, and at all levels they promise: "We will make it better; we will try..."

"How long will specific measures be replaced by promises?" we asked Rayispolkom Chairman V. G. Golubya.

"The problem is solved," he stated. "Soon we will begin construction of a new consultation; we are preparing the documentation..."

Construction is a future matter, but medical service to women of the rayon needs to be fixed immediately, without delay.

12262
CSO: 1840/1620

OVERCROWDING IN CITY HOSPITAL

Moscow MOSKOVSKAYA PRAVDA in Russian 18 Jul 84 p 2

[Article by I. Panov, chief physician of City Clinical Hospital No 20:
"The Hospital is Overcrowded. Why?"]

[Text] Speaking of the situation in the hospital [statsionar] at this moment, it is probably not overcrowded, but right now, as in all hospitals, we have somewhat of a seasonal, summer lull. In two or three months, however, we will once again have to put beds in the corridors. Why?

There is no simple answer to this question, because there are many causes. I will try, however, to speak of the main ones that I know are bothering not just myself but also my colleagues, the public health organizers. Summer is vacation time for many, including the so-called chronic patients, i.e., those who periodically need hospital treatment. However, during the summer they prefer to rest at sanatoria, rest homes and dachas and they go to the hospital in late autumn, winter and early spring, just when an increase is noted in various acute illnesses and there are more people who need to be in the hospital. Meanwhile, prophylactic treatment during the summer period can avert exacerbation of achronic disease in winter.

Frankly speaking, it is difficult for me to imagine how to combat this situation. How does one force a chronic invalid to stay in the hospital precisely in summertime? Even if he himself stays in the city, his relatives and friends leave and he stays in the hospital alone. Nonetheless, it seems to me that we must actively work on this seemingly out-of-control process. Obviously, polyclinics which send people to inpatient treatment must conduct explanatory work with patients and their relatives.

So-called hospitalization by permits seems very promising to me. It was suggested by the Main Health Administration of the Moscow Gorispolkom. Its essence is as follows: every week the hospital releases permits for hospitalization to the polyclinics attached to it. According to these permits, the polyclinics send us patients with acute and chronic diseases who need hospital treatment. Let us say that two polyclinics of Babushkinskiy Rayon, Numbers 20 and 120 are attached to our hospital. Every week we release 31 places for these polyclinics. The polyclinic physicians

send us patients according to their judgment, based on the interests of the patient, of course, but they send no more than the prescribed number.

I note here the required contact with the polyclinic which we have successfully established. First of all, we are almost always able to depend upon the results of examinations conducted by the polyclinic; therefore a patient is admitted for treatment in the hospital with no time wasted on repeat examination. Moreover, the polyclinics that I mentioned usually send us only those who actually need hospital treatment. Thus, we can make the rest of the places in the wards available for emergency patients, and by knowing in advance how many patients there are with chronic and acute diseases, we can plan their distribution throughout the wards. We have been working according to the new system scarcely more than a year, but at this moment we can say that the overloading of the internal medicine department has already been reduced substantially. Therefore, we think that hospitalization by permit merits introduction where possible, and not just in internal medicine.

I said "reduced substantially", but not eliminated and I have to explain what I mean. Incidentally, this does not pertain to our hospital alone. Almost all hospitals in Moscow are clinical hospitals. This means that students of medical institutes are constantly practicing in them. Our hospital building is relatively new in comparison, let us say, with such old hospitals as First Gradskaya, Botkinskaya and several others. However, for some reason when it was planned, the architects did not provide space for departments and clinics and we therefore had to turn certain wards and special areas into offices for professors and instructors, and into classrooms, and hospital beds naturally had to be crowded together.

Hospital overcrowding is not just extra bed in the wards, but sometimes even beds in the corridors. This is an extra burden for all medical personnel. It particularly affects nurses [medsestra] and orderlies [sanitarka]. This is the worst bottleneck in all hospitals. When a hospital is overcrowded, the care of 45-58 patients, instead of the 30 authorized, rests on the shoulders of one orderly.

Five years ago, a suggestion was made in the pages of our newspaper that junior medical personnel should work according to the brigade method. Many were skeptical of this, but it was then decided to conduct an experiment in three hospitals: Nos. 51, 63 and ours. Thus, our orderlies have been working according to the brigade method since 1981. Introducing it was not easy, since the brigades themselves were difficult to make up--there are simply no orderlies, but in the final analysis the brigades were created. Indeed now, despite everything, it can be said that the brigade method is worthwhile. Brigade members have been pleased that their work is evaluated by the entire collective and that they decide all together to whom and in what amount monthly bonuses are awarded. Also, every orderly worries not only about herself, but about the whole collective.

Even as we discuss this with you, we are once again choosing a brigade, since those who were in the former one (and this was a brigade made up of young girls, some of whom had graduated from the night department of the medical secondary school, others had started families) had left the hospital for various reasons. And so now we have to choose a new brigade. From whom? As before, there are no orderlies. It would be proper if all school graduates who had decided to devote themselves to medicine would be obliged to spend a year or two working as an orderly in a treatment institution before admission to schools or medical institutes.

This would solve the problem to some degree and, moreover, would be a unique examination for the right to obtain a medical education.

In this case, then, there would be fewer people in medicine by accident. One would think that it is not necessary here to talk about how dangerous such people are in our work. They are undesirable everywhere, but in medicine, which is constantly dealing with live man and his sufferings, this is simply unthinkable. Indeed, to be a good physician it is not enough to be a highly qualified specialist: special human qualities are also necessary.

By constantly analyzing the causes for complaints and claims made by patients and their relatives against us, we are convinced that they are most frequently caused by lack of attention and staleness. Sometimes it is worth talking to a person and listening to him, answering questions on how to get rid of a mass of problems. In one of our departments there are no complaints, and in others, where the treatment process is not going any worse, there are. The explanation for this is simple; there are not complaints in a department where the medical personnel always find time to talk and pay attention to each patient and his relatives.

Together with the party organization, we are always thinking about how to improve contact with patients and their relatives, and somehow we manage to do this. Let us say that previously we had complaints about the fact that relatives were not able to talk with the department chief. The times that they visited the hospital were either evening hours or days off, and the chief is not at the hospital during these hours. How to get out of this situation? We hung special boxes near every department chief's office, and wrote on them that if patients' relatives had questions they could write them down and put the papers in the box. We ask visitors to indicate their coordinates, so that the chief might communicate with them by telephone and arrange a meeting or answer questions.

We have made one more step toward meeting patients halfway. We have begun to hold meetings of the administration and representatives of the hospital party buro with patients. At such meetings they can make claims against us and suggestions regarding the organization of our work. Neither physicians nor nurses, in general no one except the administration and party buro representatives, participate in these meetings. In this manner we wish to attain maximum frankness. We hope that this will also help us to organize our work more efficiently, and a great deal more depends upon organization, including the problem of overcrowding, which we have begun to address.

CHILDREN'S HEALTH CARE SURVEYED

[Editorial Report] Tashkent SOVET OZBEKISTONI in Uzbek 7 April 1984 carries on page 2 a 1,100-word article by Prof., Doctor of Medical Sciences O. Mahmudov, Rector of the Tashkent State Medical Institute, titled "Children's Health is the Future's Wealth." The article is published in conjunction with World Health Day, and consists of a survey of republic health care for children. From the point-of-view of the number of pediatricians and hospital beds for children Uzbekistan is rather substantially ahead of Great Britain, France, West Germany, Japan, the United States, and other developed capitalist countries. Specialists are trained at the Central Asian Pediatrics Institute and at various medical schools. The number of polyclinic facilities approaches 1,000, and of hospital beds for children, 50,000. Specialists in 25 areas are available in hospitals and in 8-16 areas at children's clinics. Reanimation and intensive therapy sections have been opened in all large children's hospitals. Brigades specialized in providing emergency medical aid to children have been formed in all cities. In rural dispensaries the position of pediatrician has been added. At obstetrician stations the position of nurse for helping children under one year old has been funded from collective farm funds. The Uzbekistan Pediatrics Institute has formed a treatment and diagnostic group for both mother and child, the first of its kind in the country. There are now 48 children's sanatoriums at pediatric treatment and prevention establishments. Efforts are also being made to provide women with all the necessary sanitary and hygienic information for childbirth and rearing.

IRREGULARITIES UNCOVERED AT REPUBLIC DRUG ADMINISTRATION

[Editorial Report] Tashkent SOVET OZBEKISTONI in Uzbek 10 April 1984 carries on page 2 an 800-word article, under the "At the UzSSR People's Control Committee" rubric, titled "When Demandingness is Forgotten." The article reports the results of the PCC's investigation of the Main Administration for Supply of Drugs, Medicines, and Medical Supplies of the UzSSR Ministry of Health. It was found that health establishments are not being adequately supplied with a variety of necessary drugs, and regulations concerning the use and distribution of drugs are being broken. The main pharmaceutical warehouse of the ministry doesn't distribute drugs promptly, resulting in the disruption of supplies, particularly to rural medical stations, where some 30-50 drugs are in extreme shortage. Numerous, necessary drugs can't be found or are in short supply at republic pharmacies. Some pharmacies and sanitation and hygiene stores hide certain medical supplies and drugs, though in many such cases adequate quantities are available in warehouses. Some doctors write prescriptions for drugs in very short supply because of weak communication between them and pharmacies. This results in patients spending far too much time in search of such drugs. In addition, there are a number of shortcomings in the use of drugs at health facilities. In some cases doctors do not provide the treatment they should and patients are required to seek help "in outlying districts." The supply of drugs to Tashkent City pharmacies and medical establishments is grossly inadequate. City pharmacy administration leaders are to blame for irregularities in distribution and for the failure to organize a central information bureau. Such shortcomings are especially acute in Syrdarya, Tashkent, and Andizhan Oblasts, where substandard sanitary and hygienic conditions at pharmacies were also noted. The PCC drew the attention of the Ministry of Health to the results of its investigation. S. Abdurazzoqov, Chief of the Tashkent City Pharmacy Administration, was removed from his post, and fines, reprimands, and other actions were taken against health officials of Tashkent, Andizhan, and Syrdarya Oblasts.

POOR DENTISTRY STANDARDS

Moscow PRAVDA in Russian 10 Jul 84 p 3

PANKRATOV, L., Pravda correspondent, Stavropol Kray

[Abstract] After anecdotal cases of failure of dentistry work after only short periods are cited the reasons for poor dentistry standards in Stavropol Kray are examined. First, it is asserted that some dentists seek refuge for poor work in instructions issued in 1972 by the USSR Ministry of Health regarding the warranty periods for dentistry work: all kinds of dental work were to have the same warranty period, regardless of the nature of the work or of the materials used. Random opinions of practising dentists, including A. Kur'yanov, chief stomatologist in Stavropol Kray, indicate the inadequacy of these instructions. Gold fillings and crowns appear to cause the most trouble, often failing after only short periods. It is pointed out, however, that, for example, V. Soldatov, a top-category orthopedist at a polyclinic, uses gold fillings when treating patients, and the average time before failure is from 10 to 20 years. The inconvenience and distress caused to patients by inadequate dental work are discussed. Some of the inadequacies appear to stem from the poor professional skills of dental technicians and defects in the equipment used to take dental impressions. Hundreds of thousands of patients are said to be encountering problems with ill-fitting dentures. It is concluded that, in order to improve matters, the 12-year-old instructions on dentistry issued by the USSR Ministry of Health should be reviewed because some of their provisions are actively hampering the provision of adequate dental services. No references.

[9642-1557]

REFLEX-PUNCTURE THERAPY IN TREATMENT OF ALCOHOLISM

Moscow MEDITSINSKAYA GAZETA in Russian 25 Jul 84 p 3

GAPONYUK, P., Central Scientific Research Institute of Health Resorts and Physiotherapy

[Abstract] Reflex-puncture therapy (acupuncture, cauterization, heat treatment, electropuncture, electroacupuncture, laser therapy) is discussed in the context of alcoholism therapy. One of the mechanisms involved in alcoholism is lowered cerebral capacity to secrete the endogenous opiates (encephalins and endorphins) responsible for pain suppression and enhancement of the emotional state. The neurostimulatory effects of today's reflex-puncture therapy procedures are used to improve the metabolism in specific parts of the brain, resulting in enhanced cerebral capacity to synthesize and secrete the endogenous opiates. In particular, results obtained from the use of the reflex-puncture methods in the treatment of autonomic disorders makes them one of the treatments of choice for patients with alcoholism. These methods are now being used to maintain abstention from alcohol and treat chronic alcoholic intoxication, and also in aversion therapy. The use of the reflex-puncture methods can be isolated or combined with psychotherapy and drug therapy. As the sole means of treatment they have advantages for the patient with poor drug tolerance or when psychotherapy is ineffective. Results in these procedures are often rapid, with patients noting improved well-being as soon as 10-15 minutes following procedures. They also assist in normalizing blood pressure, heart rate and respiration rate. In acupuncture therapy for alcoholism, active detoxification can also be carried out with the aid of B vitamin, magnesium sulfate, unitol (Unitholim) and other injections. In 50 percent of cases acupuncture therapy enables withdrawal of tranquilizers and neuroleptics. Further information on the use of reflex-puncture methods in the treatment of alcoholism can be found in the 1973 USSR Ministry of Health methodological instructions "Halting Delirium Tremens and Withdrawal Syndrome by Use of the Acupuncture Points."

No references.

[9642-1555]

MEDICAL EXPERIMENT TO COMBAT ALCOHOLISM

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 11 Jul 84 p 2

KUZNETSOV, G. S., first secretary of the Divnogorsk CPSU Gorkom

[Abstract] A social and medical experiment to reduce the incidence of alcoholism in Divnogorsk (Krasnoyarsk Kray) is described. The experiment stems from a study conducted by a group of scientists from the Krasnoyarsk Medical Institute led by Yaroslav Petrovich Girich, which found that in fact a) the situation was not as good as the bald statistics seemed to indicate, and that b) the proportion of patients seeking medical help at the polyclinics was very large: over a 5-year period more than 600 patients were hospitalized for treatment of the aftereffects of immoderate alcohol ingestion, resulting in a total loss of 3,762 working days. Based on the recommendations of the study group, all patients now seeking medical help at the polyclinic are now examined for signs of intemperance, and any patient showing such signs is referred on a mandatory basis to a drug abuse expert. Such patients are treated anonymously and are permitted, when possible, to continue with their normal activities. On the social plane, specially trained teams of investigators carry out spot checks at people's places of residence to curtail the development of alcoholism. Individuals showing signs of immoderate alcohol consumption must attend alcohol education classes, and additional pressure is exerted on them through their labor collective, which is informed of their condition. As a result of all these measures, in 1983 the number of individuals visiting sobering-up stations fell 19 percent, the number of alcohol-induced psychoses was reduced by one-third, and the sale of alcohol declined 6 percent. At the same time, however, the number of patients with alcoholism rose, reflecting not increased incidence but better detection of the disease. The experiment is part of an educational program aimed at teaching young people to make proper use of their leisure time by developing independent activities and engaging in sports, all of which makes up a significant part of the struggle against alcoholism. No references.

[9642-1556]

PSYCHOLOGY

PSYCHOLOGICAL AND PHYSIOLOGICAL TESTING USED IN RAILROAD WORKER SELECTION

Moscow GUDOK in Russian 14 Jul 84 p 4

[Article by G. Isakov, GUDOK correspondent: "At a Psychologist's Examination"]

[Text] The windows are curtained, the door tightly closed. Light flashes in sequence through holes in a panel, arranged in a circle. As soon as the signal makes a jump to the direction opposite the normal one, a button must be pushed. This is not in appearance a complicated task, but when it lasts for an hour or two the number of mistakes increases. Exhaustion sets in earlier in one man and later in another. The range of endurance is about to be precisely revealed.

Leaving the office, former engineer G. Pankov admitted that this was more difficult for him at this moment than when on duty. And he was a former engineer because recently he went through a prohibiting signal. The experienced engineer with many years of work experience on a diesel engine in good repair, was distracted for no more than a half minute while moving through a station, and the wheels managed to cover up the insulating joint of the outbound signal light. Pankov is no longer aboard as a controller, and he will work at another position for the several years remaining to him before retirement.

A group of scientists from the All-Union Scientific Research Institute for Railroad Hygiene conducted studies at Alma-Ata to develop a procedure for psychological examination of diesel engine operators. This problem is closely related to growing demands for the screening of engineers and their assistants who have committed a major error and to determine their professional suitability. This is particularly important for Alma Ata, since serious cases of defects in railroad work has increased in number here recently.

Specialists headed by supervisor of the Psychophysiology and Profotbor [Administration for Occupational Screening of the Population] Sector of the VNIIZhG [All-Union Scientific Research Institute for Railroad Hygiene and Candidate of Psychological Sciences L. Nersesyan have been working for a month at leading highway enterprises and at locomotive depots

in Alma-Ata and Chu. A group of diesel engine workers from Matay Depot, whose collective was handling travel safety in an unsatisfactory manner, also underwent examination. Pankov is from Matay. The findings obtained for him are not comforting: it is his nature to turn off his attention under prolonged monotonous conditions.

The scientists used a number of instruments to simulate characteristic situations, including some that were unique, with no analogs in domestic practice. There is, for example, the PIB-2 apparatus for studying vigilance. It determines the degree of attentiveness and reaction speed under conditions of monotony of impressions inherent in the work of diesel engine workers. The compact Spectrum-B microcircuitry apparatus is used to evaluate the functional condition of energy expenditures of test subjects in the attainment of positive results, in other words, the cost of overcoming stresses: what comes easily to one person requires enormous rapidly tiring stress on the part of another.

The FKUB [Russian language abbreviation of "physiological monitoring of level of alertness"] apparatus for physiological control of the level of alertness, has been called upon to replace "vigilance levers" already existing in diesel engines. Engineers are accustomed to these levers and duly pull on them on the strength of a generated reflex even in a somnolent state. A new product will either wake up a sleepy person or provide wear on the brakes with a full guarantee. FKUB is now conducting field tests before starting production of a series.

Moreover, personality characteristics were compiled. For this the test subjects filled out special questionnaires, including up to 400 various points. To deceive or to try to make a favorable impression is impossible here. Up to 50 questions were put on the pages dealing with each of the character attributes, emotional stability, sense of responsibility, capacity for self control. You can't trick or argue with science! Some careless workers had felt that the ChP [extraordinary event] that had happened to them was a matter of chance, bad luck, and they convinced themselves with their own eyes that they had simply made a mistake in their choice of occupation.

The experiments that have been have aroused great interest. The basic part of the information obtained will subsequently be processed by computer and will serve as the basis for standard practical recommendations. And the data obtained have made it possible to specify right on the spot the degree of suitability of individual engineers and assistants for their chosen occupations. If they had undergone in-depth testing before embarking upon transportation, dangerous failures would not have occurred in their work duty in another field. The organization of such preliminary examination of all who wish to connect their future to train travel is the business of the not too distant future.

Casual people who, according to their natural data are not suited for fulfilling demanding functions must not end up in the responsible part of the

operation--the locomotive! They can ride safely for a year or ten years, and nevertheless will be sure to fail under extraordinary circumstances. The identification of predispositions to this lodged in the organism from the beginning is a task of enormous importance. The relationship of science and production will undoubtedly help to reduce the number of cases of defective work, dependent not upon technical causes but on the psycho-physiological condition of the workers.

12262
CSO: 1840/760

COMPARATIVE POPULATION STUDY OF GENETIC BASES OF INDIVIDUAL PSYCHOLOGICAL DIFFERENCES

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 5, No 3, May-Jun 84
(manuscript received 2 Apr 82) pp 95-108

DUBININ, NIKOLAY PETROVICH, academician, head of the Laboratory of Mutagenesis, Institute of General Genetics, USSR Academy of Sciences and BULAYEVA, KAZIMA BAGDADOVNA, candidate of pedagogical sciences, director of a psychological genetics group at the Psychological Genetics Institute

[Abstract] Comparative population analysis of variability and heritability of neurodynamic and psychodynamic parameters of man in isolated and panmictic populations showed the effectiveness of the genetic-population approach, proposed by the authors, in the study of individual psychological differences. Use of the method showed the hierarchic nature of the effect of social and genetic factors on human behavior. Traits at the morphological level were least variable and more rigidly inheritable, traits at the psychodynamic level were most variable while traits at the neurodynamic level occupied an intermediate position. The tendency toward normality of variation distribution of neurodynamic and psychodynamic parameters studied increased with an increase of isolation of a population. Age-related dimorphism increased with an increase of differences in the social sphere of different generations. Sex-related dimorphism in some of the parameters studied resulted from both social and genetic causes. The study showed the importance of considering both genetic and social features of a given population during examining individual psychological differences and evaluating all findings in relation to this population only. Figures 3; references 30: 22 Russian, 10 Western.
[745-2791]

RADIATION BIOLOGY

UDC 636:539.1.047

HEMATOLOGICAL REACTION OF FARM ANIMALS TO TOTAL IONIZING RADIATION (SURVEY
OF LITERATURE)

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 6, Jun 84
(manuscript received 21 Feb 83) pp 93-100

KRUGLIKOV, B. P., All-Union Scientific Research Institute of Agricultural
Radiology, USSR Ministry of Agriculture, Ochninsk, Kaluga Oblast

[Abstract] Hematological changes in the peripheral blood of farm animals after X-ray or gamma-irradiation are described and discussed on the basis of material from the literature. Aplastic anemia was found in all animals studied 2-3 weeks after irradiation. Complete restoration of erythrocyte concentration did not occur for a very long time after irradiation. The leukocyte count dropped markedly after irradiation. Maximum thrombocytopenia correlated with the height of the hemorrhagic syndrome. All formed elements of the blood changed quantitatively after irradiation and all changes were directly related to the irradiation dose. Thrombocytopenia followed leukocytopenia in the animals and the lowest concentration of platelets in the blood was noted before animals died. Data presented in the literature are unsuitable for quantification of results by mathematical processing.

References 61: 30 Russian, 31 Western.

[1077-2791]

UDC 577.391

NONSPECIFIC REACTIVITY AND INDIVIDUAL RADIOSENSITIVITY

Moscow USPEKHI BIOLOGICHESKIKH NAUK in Russian Vol 15, No 3,
Jul-Sep 84 pp 64-82

GRIGOR'YEV, A. Yu., Institute of Biophysics, USSR Ministry of Health

[Abstract] A relationship has been determined to prevail between nonspecific reactivity to stress and individual radiosensitivity in various experimental animals, as evident from a review of pertinent scientific literature to which Soviet workers have made a major contribution. The responsiveness and its various gradations are largely predicated on the adaptability and the functional status of the central nervous system, and can be used to estimate the extent of expected radiation damage or severity of radiation sickness. The parameters that have been well studied in various stressful situations include arterial blood pressure, pulse rate, body temperature, pulmonary minute volume, respiratory rate, and blood counts. Other parameters substantiating a relationship between reaction to stress and radiosusceptibility included changes in enzymatic activities and the levels of hormones and other metabolites in the various body fluids and tissues. Stress factors that have been particularly informative in such studies include constant magnetic fields, ultrahigh frequency radiations, and angular and rectilinear accelerations, especially when applied under actual or simulated high-altitude conditions. Figures 5; references 102: 85 Russian, 17 Western.

[782-12172]

UDC 612.017.1.014.482:519.86

MATHEMATICAL MODELING OF RADIATION EFFECT ON IMMUNE SYSTEM

Moscow IMMUNOLOGIYA in Russian, No 2, Mar-Apr 84
(manuscript received 18 Nov 81) pp 38-42

SMIRNOVA, O. A., Institute of Medical Biological Problems, USSR Ministry of Health, Moscow

[Abstract] The fruitful application of mathematical models to immunology research has been solidly justified by achievements in theoretical and experimental immunology. The present article describes use of such modeling to clarify the effect of various doses of ionizing radiation on the dynamics of the humoral immune response; it also analyzes the temporal characteristics of the processes of post-radiation injury in recovery of the immune system. Initially, a model was constructed of the dynamics of humoral immunity; this was limited to the first humoral immune response to a soluble T-independent antigen, when the role of the T-cell-helpers cannot be studied; the model is based on Bernet's clonal-selection theory. A block design of the model of

the dynamics is presented, coupled with pertinent mathematical expressions (non-linear differential equations) of the stages of response. The model (derived in seven mathematical expressions) is realized in the form of a FORTRAN program. A model of the post-radiation dynamics of lymphopoiesis is then constructed which is limited to post-radiation damage and recovery of cells of the lymphoid series and their predecessors in bone marrow. Finally, a model is constructed of the combined action, on immunity, of antigen stimulation and irradiation in mammals; the model is realized in the form of a system of differential equations for concentration of antigens, antibodies, damaged by radiation, and undamaged immunocompetent cells, and their predecessors, in bone marrow. It is suggested that the model can be used to predict the state of a mammalian immune system. Figures 4; references 11: 9 Russian, 2 Western.

[1532-8586]

VETERINARY MEDICINE

ROLE OF JOURNAL IN ADVANCED TRAINING OF MILITARY VETERINARY PERSONNEL

Moscow VETERINARIYA in Russian No 5, May 84 p 20

[Article by V. N. Tulupov, chief of the Military Veterinary Faculty, Moscow Veterinary Academy, candidate of veterinary sciences and Colonel of Veterinary Service]

[Text] The journal VETERINARIYA has already been an active propagandist for the foremost achievements of veterinary science and practice of military veterinary physicians and feldshers for 60 years.

It takes its origin from the journal PRAKТИЧЕСКАЯ VETERINARIYA I KONEVODSTVO, published from May 1924 by the Main Military Veterinary Directorate of the RKKA [expansion unknown] with the active cooperation of the vice-chairman of the Revolutionary Military Council M. V. Frunze.

The journal has been covering questions of military veterinary science in a purposeful manner from its first days to the present.

In the prewar period, principal attention was paid to interpretation of party and state policy on improving the organization of the Military Veterinary Service under conditions of socialist construction, determination of directions for the training and education of veterinary personnel with higher and secondary qualification and junior veterinary specialists loyal to the socialist native land, and the substantiation from a scientific standpoint of the content and sequence of veterinary prophylactic and anti-epizootic and therapeutic measures conducted in the army.

In the bleak years of the Great Patriotic War, the journal VETERINARIYA was the basic mass propaganda agent for the experience of the veterinary service, having no equal either in terms of the depth or scale of work in past wars.

This promoted increased effectiveness in the work of specialists at field military-veterinary institutions and of the treatment-evacuation network, as well as establishment of clear veterinary-sanitary control over provision of the troops with high quality food and organization of prompt and according-to-plan procurement of veterinary materials.

Leaders and organizers of the Military Veterinary Service of the Center, the fronts and armies and also noted scientists--leading specialists in the service--worked together actively on the journal, providing a high scientific and practical level of publications. They were: Lieutenant Generals of the Veterinary Service V. M. Lekarev, N. M. Vlasov, A. M. Penionzhko, N. M. Shlayer, Yu. A. Lyanda, Major Generals of the Veterinary Service A. A. Petukhovskiy, S. L. Alichkin, L. S. Goberman, S. P. Finansov, P. G. Golushko, I. V. Novikov, Ye. I. Kuznetsov, A. P. Korniyenko, M. S. Gannushkin, Ya. Ye. Kolyakov, I. V. Shur, A. M. Laktionov, Colonels of the Veterinary Service S. M. Vorontsov, I. D. Medvedev, G. M. Gradyushko, B. A. Levadniy, G. P. Sutyagin, P. Ya. Rybak, P. S. Ionov, I. Ye. Mozgov, I. G. Sharabrin, M. V. Plakhotin, I. V. Voystrikov, N. A. Kuz'min, Ye. V. Kozlovskiy, P. I. Pritulin, D. D. Poloz, M. M. Mikhaylov, P. N. Motokhin and many others.

At present, due to the scientific-technical revolution in military affairs, the tasks presented to the Military Veterinary Service are being developed and filled with new subject matter.

As a member of the editorial board, O. S. Belen'kiy, Major General of the Veterinary Service and chief of the Military Veterinary Service of the USSR Ministry of Defense, writes basic articles revealing methods for its improvement in the pages of the journal. Leading specialists throw light upon urgent problems of the service; their publications devote and important place to determining the actions of the veterinary staff of all links of the service during the enactment of measures for protecting personnel from diseases common to man and animals, and from diseases that can develop with the consumption of poor quality food. The practical experience of army and navy veterinary specialists in carrying out the Food Program among the troops is revealed.

The journal also acquaints readers with problems of training personnel for the Military Veterinary Service. Thus, in the article "Military Veterinary Medicine", in the February 1983 issue, O. S. Belen'kiy notes that an indispensable condition for the further improvement of veterinary provision of the troops is a constant concern for filling the service with highly qualified personnel, with professional, administrative and moral qualities that are in high demand today.

The Military Veterinary Faculty at Moscow Veterinary Academy has been entrusted with the solution to this most important problem. It is here specifically that future specialists become proficient in vocational knowledge and acquire versatile practical skills. The journal VETERINARIYA also plays a significant role in this, as it was and still is a daily handbook for officers in the veterinary service, and especially for today's students at the faculty, who in the near future will have to solve the complex problems of the service in the armies at a qualitatively new level.

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12262
CSO: 1840/771

UDC 636.619;576.8.097.2:[577.213.7+577.217.]

PRESENT STATUS AND PROSPECTS OF RESEARCH CONCERNING PRODUCTION OF NEW
FOOT-AND-MOUTH DISEASE VACCINES (SURVEY)

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 6, Jun 84
(manuscript received 13 Oct 83) pp 101-111

RYBAKOV, S. S. and BURDOV, A. N., All-Union Scientific Research Foot-and-Mouth Disease Institute, Vladimir, Yur'yevets Village

[Abstract] A survey of the western literature on the subject showed the possibility of producing synthetic vaccines against foot-and-mouth disease and justified the extension and expansion of investigations carried out for this purpose. The advisability of carrying out research aimed at producing second generation vaccines by gene engineering methods is discussed. It has been assumed that safe and stable attenuated strains for production of live vaccines may be obtained by use of DNA recombinant technology. Possibilities of using VP [viral-specific polypeptides split by appropriate proteases] and its fragments in production of safe vaccines are discussed. Figures 2; references 44: 1 Russian, 43 Western.

[1077-2791]

UDC 619:615.371:616.981.45

BIOLOGICAL STABILITY OF AEROSOL VACCINES IN RELATION TO REHYDRATING AGENT COMPOSITION

Moscow VETERINARIYA in Russian No 5, May 84 pp 32-34

DUBROV, I. S., ISHCHEKO, G. D. and MATROS, A. A., Krasnodarsk NIVS
[expansion unknown: a veterinary station?]

[Abstract] A live avian pasteurella vaccine was used in evaluation of factors determining and viability and stability of aerosol vaccines. Analysis of the time course of stability and viability demonstrated that the medium assuring optimum viability and stability consisted of whole milk supplemented with 10% glycerin and 10% sucrose. Such a medium minimized

settling due to the generation of 2-6 μm particles (only 10.44% of the particles exceeded 5 μm) and inactivation of the bacteria during dispersion. Furthermore, the size of the particles fell within the optimum range (up to 5 μm) for penetration into the respiratory pathways.

[770-12172]

UDC 619:616.981.42:576.809.3

BACTERIOLOGIC AUTOPSY TECHNIQUES IN BRUCELLOSIS

Moscow VETERINARIYA in Russian No 5, May 84 pp 66-67

IGNATOV, P. Ye., All-Union Institute of Experimental Veterinary Medicine

[Abstract] Suggestions are made for carrying out bacteriologic studies in a safe and efficient manner on an aborted animal fetus suspected of brucellosis. One suggestion pertains to the use of foot-operated rubber bulb with attached rubber tube and a cotton 'filter' for collecting body fluids for analysis, and freeing the hands for other manipulations. Another suggestion is made to pretreat the linea alba with 3% phenol to avoid contamination with other bacteria, and to section only one body cavity at a time. Yet another recommendation calls for humane sacrifice of guinea pigs by anesthetizing them with ether for 7-15 min prior to exsanguination. Prior to autopsy, the experimentally infected guinea pigs should be dipped in 3% phenol. Brucella are most likely to be isolated from the various lymph nodes and bone marrow of guinea pigs infected with suspected materials. Adherence to these and other recommendations should facilitate the speed and safety of such studies and diminish contamination of the specimens five- to ten-fold. Figures 1.

[770-12172]

CONFERENCES

BIOLOGICAL MEMBRANES. STRUCTURE AND FUNCTION. THIRD SOVIET-SWISS SYMPOSIUM

Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 1, No 2, Feb 84 pp 214-216

BARSUKOV, L. I., VASILOV, G. G., GRISHIN, Ye. V. and CHERNYAK, B. V.

[Abstract] The third Soviet-Swiss symposium "Biological Membranes. Structure and Function" took place 10 through 16 October 1983 in Tashkent. The symposium program consisted of thematic sections on bioenergetics, the physicochemical and molecular organization of biomembranes, membrane proteins, immunology, ion channels, and membrane-active substances. Papers were presented by 16 Swiss and 23 Soviet scientists. Workshops were also held. Soviet scientists presenting papers included V. P. Skulacheva (Moscow), T. S. Saatova (Tashkent) and M. A. Ostrovskiy (Moscow) (bioenergetics); R. P. Yevstigneyeva, L. D. Bergel'son (Moscow), I. G. Abidora (Moscow), A. A. Lvov (Leningrad) and R. K. Salyayev (Irkutsk) (molecular organization of biomembranes); N. G. Abdulayeva and Yu. A. Ovchinnikov (Moscow), N. N. Modyanov and V. V. Demin (Moscos), V. I. Tsetlin (Moscow) and A. I. Archakov (Moscow) (membrane proteins); and A. S. Sadykov (Tashkent) (membrane-active substances). The membrane aspects of immunology were dealt with in a number of reports. R. G. Vasilov's report (Moscow) covered the use of monoclonal antibodies for studying the spatial organization of bacteriorhodopsin and in structural and functional studies of implanted antigens. (K. Bleyzer) of Bern discussed the use of monoclonal antibodies for characterizing specific cerebral and neuroblast lipids. The structure and immune properties of Leishmania tropica membranes were dealt with in the report of (K. Borde) from Lausanne. V. A. Kabanov and R. V. Petrov (Moscow) presented a report on the problem of creating artificial immunogens based on synthesized membrane-active polyions. V. A. Nesmeyanov reported on a study of the T-cell growth factor (interleukin-2) in rats. No references.

[1562-9642]

ANNUAL SESSION OF GENERAL MEETING OF DEPARTMENT OF GENERAL BIOLOGY OF USSR
ACADEMY OF SCIENCES

Moscow ZHURNAL OБSHCHEY BIOLOGII in Russian Vol 45, No 4, Jul-Aug 84 pp 570-572

VYSHESLAVOVA, M. Ya.

[Abstract] The Annual Session of the General Meeting of the Department of General Biology of the USSR Academy of Sciences was held on March 13, 1984, in Moscow. The preliminary report on the activities of the Department in 1983 was delivered by the secretary, Academician M. S. Gliyarov. He emphasized the progress made in biology in light of the resolutions of the June 1983 Plenum of the CC CPSU, and the fact that the various institutions of the Department are intimately involved in making theoretical and practical contributions to various national economic programs, including the Food Program. He further provided examples of advances in the various areas of fundamental, agricultural and medical biology, with particular attention accorded to progress in genetics and breeding programs. For example, reverse transcription has been demonstrated in a bacterial system, the reverse transcriptase has been isolated and characterized, and it is currently felt that the source of the enzyme is an endogenous retrovirus. Other studies dealt with the incorporation of a fragment of wheat DNA into a bacterial chromosome, and the creation of a corresponding clone. In animals cells, it has been shown that a process exists which inhibits repairs of RNA breaks induced by chemical mutagens, a fact that may have significance for the establishment of chronic viral infections. Other examples of achievement in 1983 included the development of a method for using sex pheromones for predicting optimum eradication times for the cotton-ball moth.

[1589-12172]

MISCELLANEOUS

UDC 576.1

VIOLETION OF CHIRAL SYMMETRY IN PREBIOLOGIC EVOLUTION AND PHYSICAL ASPECTS
OF ORIGIN OF LIFE

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 6, Jun 84 pp 54-63

MOROZOV, L. L., doctor of physicomathematical sciences, and GOL'DANSKIY, V. I.,
academician

[Abstract] Despite the disparity of views regarding the origins of life, most experts are convinced that life originated in an inanimate organic environment once certain conditions of a physical nature were met. Since such conditions are presently undefined, a plan is suggested for a concrete physical analysis of a putative phenomenon in the evolution of life. The approach rests on the established fact that in distinction to inanimate Nature, in the bioorganic world chirality is the rule: virtually only L-amino acids and only D-sugars are utilized in living systems. This is in violation of the racemate state of the inanimate world, and can be expressed in mathematical terms as the degree of chiral polarization $\langle \beta \rangle$, which has a value of zero ($\beta = 0$) for the racemate prebiologic state. In the biologic state the predominance of a given optical isomer leads β to depart from zero and represents "disorder-order" transition in statistical physics. The two key factors leading to the predominance of a given enantiomer in the living system are the factors of advantage (one optical isomer is chemically more reactive) and fluctuations in the initial state (statistical fluctuations in the isomers lead to chance polarization). Since, mathematically, the factor of advantage does not show a sufficient magnitude of predominance over the statistical factors required for an evolutionary pathway to life, it appears that the strong chirality of the biologic systems came about as a result of a biological Big Bang.

References 20: 12 Russian, 8 Western.

[769-12172]

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